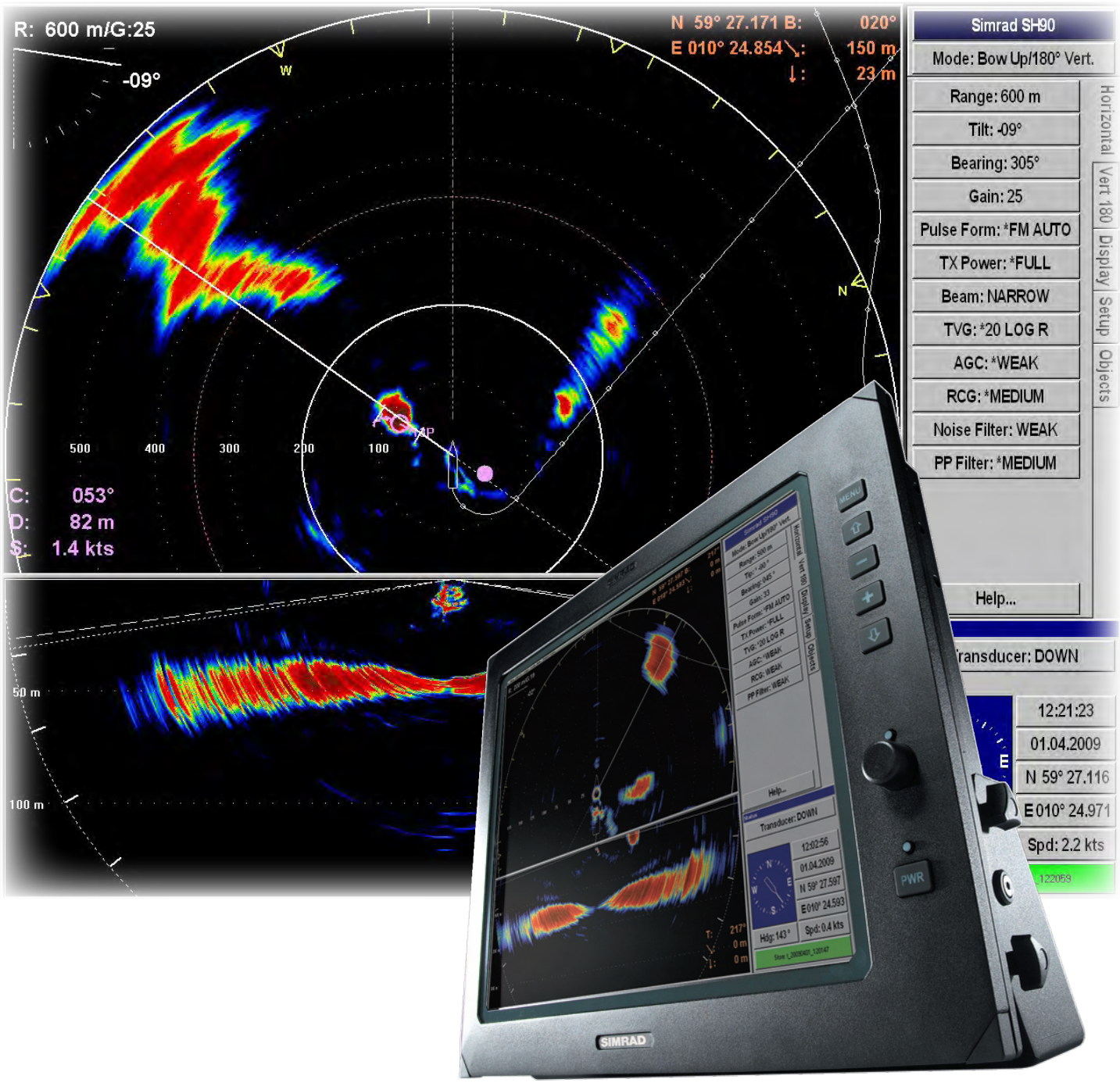
Operator manual

Simrad SH90
Fish finding sonar



KONGSBERG

Simrad SH90

Operator manual

This manual provides you with the basic information required to operate the Simrad SH90 Sonar. For a more detailed description of the operation and functionality, including menus and all parameters, refer to the *Simrad SH90 Reference manual*.

All user documentation can also be downloaded from http://www.simrad.com/sh90.

WARNING: The Simrad SH90 sonar must never be powered up when the ship is in dry dock. The transducer will be damaged if it transmits in open air. To prevent inadvertent use of the sonar, pull out the mains plug on the Processor Unit whenever the vessel is in dry dock.

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Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to install, operate or work on the equipment.
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Support information

If you require maintenance or repair, contact your local dealer. You can also contact us using the following address: simrad.support@simrad.com. If you need information about our other products, visit http://www.simrad.com. On this website you will also find a list of our dealers and distributors.

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About this manual

Purpose

The purpose of this operator manual is to provide the descriptions and procedures required to allow for safe and efficient use of the Simrad SH90.

A good understanding of system functions and controls is essential to fully take advantage of the functionality provided. Sea conditions vary, sometimes drastically, and it is not possible to identify settings that will provide the best data at all times. Careful study of the information in this manual is highly recommended, preferably while exploring the system's functionality.

SH90 operation is a dynamic activity requiring regular adjustments and fine tuning to achieve the best possible results under varying environmental conditions.

If you need more detailed information about this product, refer to the *Simrad SH90 Reference manual*.

Target audience

The manual is intended for all basic users of the Simrad SH90.

We assume that you are familiar with the basic acoustic principles of sound in water, and that you have some experience with sonar operation.

Click "Help"!

Installed on your Simrad SH90 you will find a comprehensive on-line help system. You may not find it in your language, but everything you can read in the *Simrad SH90 Reference manual* can also be found in the context sensitive on-line help.

To access this information click the **Help** button in the parameter dialog boxes.

Note that when you open the help system it will place itself on the top of the display presentation!

Online information

All operation and installation end user documentation provided for your Simrad SH90 can be downloaded from http://www.simrad.com.

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Simrad SH90

Study this chapter to familiarize yourself with the Simrad SH90.

Topics

- *Important* on page 10
- *System description* on page 11
- *System diagram* on page 12
- *System units* on page 13
- *Key functionality* on page 16
- *Support information* on page 19

Important

As with all other advanced instruments, there are a few important things that you must be aware of.

Topics

- *Before you switch on the SH90* on page 10
- *When the SH90 is not used* on page 10
- *When you are docking your vessel* on page 10
- *If something breaks down* on page 10
- *Manual operation of the hull unit* on page 10
- *Transducer handling* on page 11

Before you switch on the SH90

Before you power up the sonar, make sure that you have sufficient water depth to lower the transducer!

When the SH90 is not used

To protect the SH90 when it is not in use, we strongly advice you to hoist the transducer, even though you may not switch off the power. In narrow or shallow waters this is very important, since you may - in worst case - run the transducer into the bottom. This will damage the transducer and the transducer shaft, and extensive repair is required.

When you are docking your vessel

It is very important that the SH90 system remains switched off when the vessel is in dry dock. If the transducer is activated when out of water it may be damaged beyond repair.

As a safeguarding measure, we recommend that you remove the power fuses on the SH90 system before the vessel is docked. As an extra safety measure, the SH90 is by default powered up with the transmit power switched off.

If something breaks down

If you believe that something has broken down, contact your local dealer. He will be able to assist.

A list of all our dealers is provided on http://www.simrad.com. If you are unable to contact a dealer, observe the support information in this chapter.

→ *Support information* on page 19

Manual operation of the hull unit

In the event of improper operation, the powerful 3 kW electric motor may cause serious damage to the equipment and/or injury to personnel.

Therefore, before you start the manual operation, read carefully through the relevant procedure(s). You will then familiarize yourself with the methods and the safety requirements.

The relevant procedures are located in the *SH90 Reference Manual*.

Transducer handling

Note

All transducers must be handled as delicate items. Any wrongful handling may damage the transducer beyond repair.

***Do not** activate the transducer when it is out of the water.*

***Do not** handle the transducer roughly, avoid impacts.*

***Do not** expose the transducer to direct sunlight or excessive heat.*

***Do not** use high pressure water, sand blasting or metal tools to clean the transducer face.*

***Do not** use strong solvents to clean the transducer face.*

System description

The Simrad SH90 is an omnidirectional high frequency sonar.

It is designed for all sized fishing vessels, both purse seiners and trawlers.

The operational frequency is 114 kHz. The cylindrical multi-element transducer allows the omnidirectional sonar beam to be tilted electronically from +10 to –60 degrees. This allows you to automatically track schools of fish, and to observe the whole water volume around the vessel. A stabilising system is included for electronic pitch and roll compensation.

Great emphasis has been placed on giving the best possible sonar presentations on a high resolution colour display.

The SH90 Processor Unit is controlled by Microsoft's Windows XP® operating system, which result in a flexible choice of presentation modes for a large range of user applications. The signal processing and beamforming is performed in a fast digital signal processing system using the full dynamic range of the signals. In addition to the traditional single frequency transceiver system, the Simrad SH90 contains an advanced frequency modulated filter system (FM).

System diagram

A standard SH90 system diagram is provided. Interface capabilities, uninterrupted power supplies and power cables are not shown.

A *Processor Unit*

B *Colour display*

C *Operating Panel*

D *Operating Panel Power Supply*

E *Transceiver Unit*

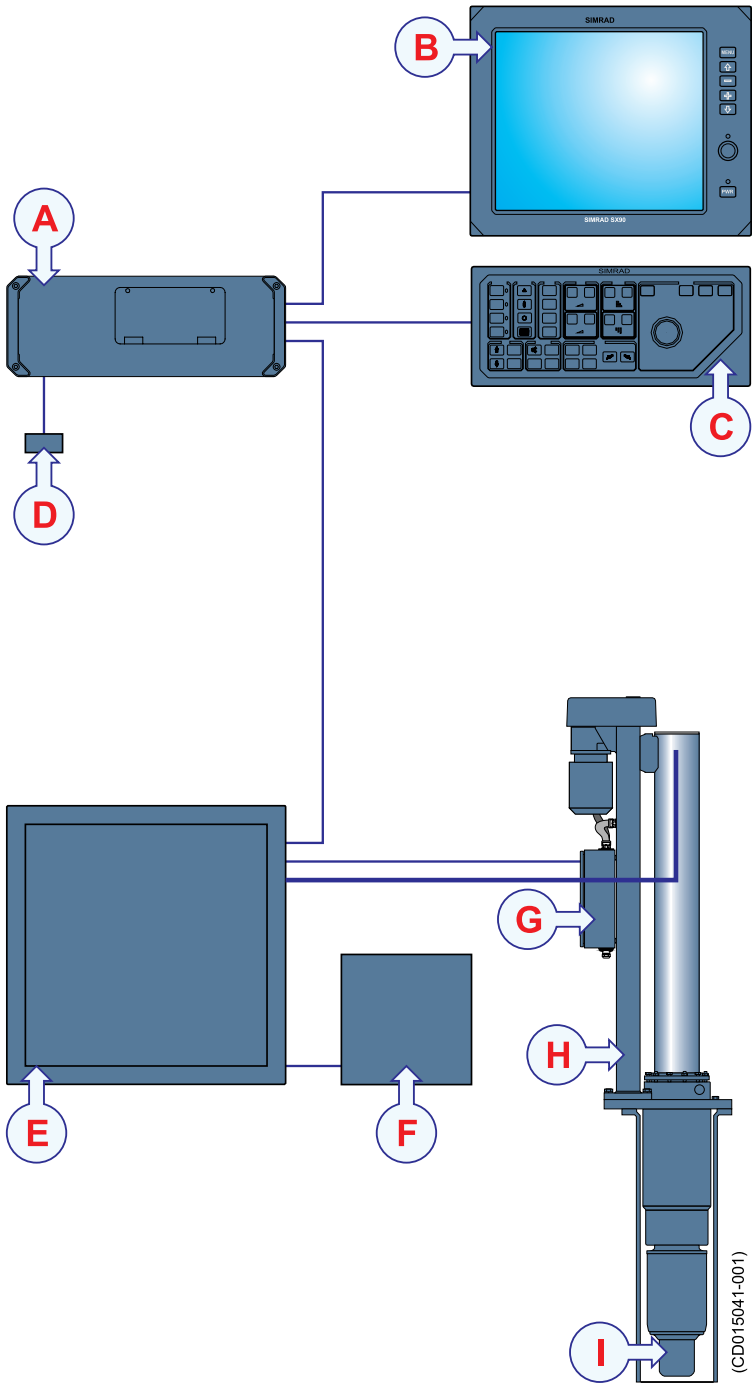
F *Power Supply Unit*

G *Motor Control Unit*

H *Hull Unit*

I *Transducer*

The colour display is not included in the standard delivery from Simrad. This is a commercial item that can be purchased locally.



System units

The Simrad SH90 comprises the following units.

Topics

- *Colour display* on page 13
- *Processor Unit* on page 13
- *Operating Panel* on page 13
- *Operating Panel power supply* on page 13
- *Transceiver Unit* on page 14
- *Power Supply Unit* on page 14
- *Hull Unit* on page 14
- *Transducer* on page 15

Colour display

A commercial colour display is used with the Simrad SH90 system.

Note that the colour display is not a standard part of the SH90 delivery.

Processor Unit

The Processor Unit is a marine computer based on the Microsoft Windows® XP® operating system. It is designed for rugged use.

The computer is based on a commercial design, but the software and hardware has been specified and assembled by Simrad to suit the SH90 requirements.

The computer holds a DVD player and multiple USB ports for use with future software upgrades.

Operating Panel

The Operating Panel contains all necessary control functions for normal operation of the SH90.

The controls are arranged in logical function groups, this gives a clear and easy operation.

The majority of the SH90 functions can be accessed using the trackball on the Operating Panel and the menu system on the display. You can also use a standard computer mouse.

Operating Panel power supply

A small commercial power supply is implemented to provide stand-by power to the Operating Panel. The power supply is connected to the Processor Unit.

Transceiver Unit

The SH90 Transceiver Unit is located in the sonar room, close to the Hull Unit.

The transceiver performs the transmission and reception control of the 480 transmitters and 480 receiver channels. 16 identical transceiver boards are used. A dedicated power supply is provided to supply the required DC voltages to the transceiver. One Ethernet cable is used for communication with the Processor Unit on the bridge, and a second Ethernet cable is used to control the hull unit. The third Ethernet cable connects to the Power Supply Unit.

The transducer cables from the hull unit are plugged into the side wall of the Transceiver Unit cabinet using a special plug.

The Transceiver Unit is mounted on the bulkhead using powerful shock absorbers. The connectors for power and interface are located at the bottom of the cabinet.

Power Supply Unit

A dedicated Power Supply Unit is provided. Its purpose is to provide the Transceiver Unit with operational DC power.

Caution

The Power Supply Unit contains high voltages. Do not open the cabinet door while the SH90 is switched on.

Hull Unit

The Hull Unit is designed to lower the transducer 1.0 meters below the ship's hull.

When the sonar is switched on, press the **Down** button on the Operating Panel to lower the transducer into the water. Before the sonar is switched off, press the **Up** button on the Operating Panel to retract the transducer into the installation trunk for protection. If you forget this, the transducer is hoisted automatically before the sonar is switched off. It is also hoisted automatically if a serious malfunction occurs to the communication between the bridge and the hull unit.

The transducer can also be lowered to any selected middle position. In case of voltage failure, the transducer can be raised or lowered manually by means of a hand crank.

The sensor for the electronic stabilisation of the sonar beams is housed in the Motor Control Unit, which is mounted on the Hull Unit.

Caution

If the transducer hits larger objects or bottom, the transducer shaft may be bent, or - in worst case - it can be broken off. A broken transducer shaft will cause water leakage through the top of the shaft.

In such cases, do not raise the transducer shaft to its upper position.

To prevent serious damage, you must have a water pump and a warning system in the sonar room.

Transducer

The cylindrical Transducer allows the sonar beam to give full 360 degrees coverage of the water volume from +10 and down to -60 degrees.

Key functionality

The Simrad SH90 offers certain key functions.

The basic principles of the Simrad SH90 are unique because of the 480 transmitter and 480 receiver channels with their transducer elements spread around on the cylindrical transducer.

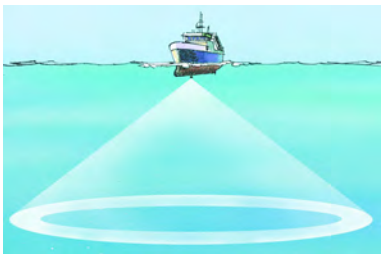
The transmission, reception and data processing are under computer control, and the powerful capabilities of the sonar are the results of sophisticated digital signal processing software and state of the art hardware.

Topics

- *Omni beam presentation* on page 16
- *Vertical slice presentation* on page 16
- *Combination of omni and vertical slice* on page 17
- *Multiple frequency operation* on page 17
- *Stabilization system* on page 17
- *Reception filters and functionality* on page 17

Omni beam presentation

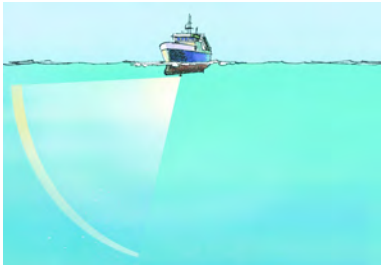
When the *Omni* beam is tilted, the total beam picture can be compared with folding an umbrella, which means that all beams in 360 degrees around the vessel have the same tilt angle.



The beam can be tilted from +10 up to -60 degrees down.

Vertical slice presentation

In addition to seeing the target from above, it is also possible to see the target from the side, by using the vertical slice presentation. In this case the beam covers a continuous vertical beam from 0 to -60 degrees in one transmission.

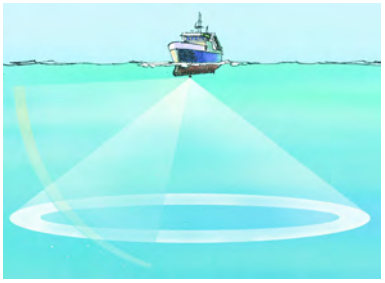


This vertical slice, which is presented by the white bearing line (also frequently referred to as the “audio line”) in the horizontal picture, can be selected to any bearing by the manual training control.

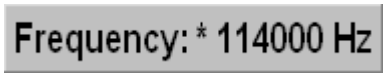
In addition to the *Omni* picture, the vertical slice is especially useful for visualizing the vertical distribution of a school of fish. In that way, it is not necessary to go over the target to see the distribution on the echo sounder, which often results in a spreading of the school.

Combination of omni and vertical slice

The combination of the Omni mode and the vertical slice will give an optimal visualization of the catch situation.



Multiple frequency operation

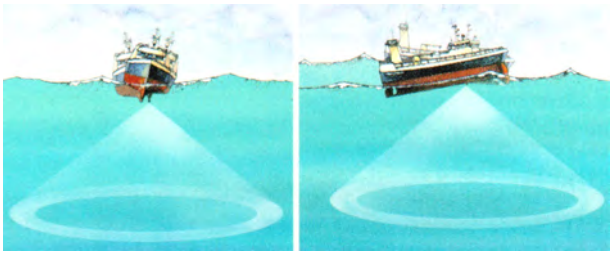


In addition to the standard 114 kHz frequency, you can select any operational frequency from 111,5 to 115,5 kHz in 0,5 kHz steps.

This is a very useful function when it is necessary to suppress interference from other sonars.

Stabilization system

The Simrad SH90 is provided with a stabilisation system.



When the beam stabilizer is activated, both horizontal and vertical beams will be stabilized electronically for roll and pitch movements up to ±20 degrees. The beam direction will then change continuously according to the vessel's movements, and secure an optimal contact with the targets even in rough seas.

The default sensor for the beam stabilizer function is located inside the Motor Control Unit.

You can also connect an external motion sensor to the SH90. This will provide a more accurate compensation.

Reception filters and functionality

A great effort has been made to reduce unwanted noise to get a clean and stable echo presentation. To achieve this goal the sonar receiver has several filter functions.

FM Correlation filter

The FM (frequency modulation) is a sweep in frequencies. The receiver filters out those signals that are the same as the transmitted. This provides a filtering effect, which efficiently reduces interference, noise and reverberation.

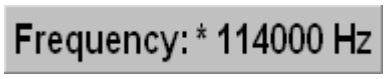
In addition to giving a clean and stable echo presentation, this will normally also increase the sonar's detection range. The advantage of the FM correlation filter is that it retains the high resolution in range with long pulse lengths and high energy, and that it is not sensitive to moving targets.

Note that this filter is built into the software. It is not available as a function you can control on the menu system.

Frequency selection

The multiple frequency selections can be used for suppression of interference from other sonars.

The sound absorption in salt water increases with the frequency, thus giving the lower frequencies a longer detection range.



Related topics

- *Changing the operational frequency* on page 35

AGC (Automatic Gain Control)

The AGC (Automatic Gain Control) senses the echo level in several directions, and use this as a basis for adjusting all the receiver beams. The AGC will thus provide automatic scaling of the data in order to maintain proper dynamic range based on all echo values

The strength of the filter can be selected in the menu.

Related topics

- *Adjusting the Automatic Gain Control (AGC)* on page 36
- *What is AGC?* on page 102

RCG (Reverberation Controlled Gain)

The RCG function adjust the picture to minimize influence from bottom and surface reverberation.

The strength of the filter can be selected in the menu. With maximum strength is selected, the RCG will effectively reduce the bottom in shallow water, while variations on the bottom will be displayed. Note that scattered fish can be perceived as reverberation. The RCG filter must therefore be used with care if scattered schools are to be detected.

Related topics

- *Adjusting the Reverberation Controlled Gain (RCG)* on page 38
- *What is RCG?* on page 105

Ping-to-ping filter

The Simrad SH90 is equipped with a ping-to-ping filter (PP Filter) to provide a clean and steady presentation by reducing the interference and noise. This filter compares the echoes from a selected amount of transmissions (pings), and an echo has to be present in the selected amount of pings in order to be presented on the display.

Note that in rough seas, when the beam easily can miss the target in several pings, the PP Filter must be used with care.

Related topics

- *What is the PP Filter?* on page 103

TVG (Time Variable Gain)

The Time Variable Gain (TVG) function controls the gain of the receiver so that a school with a given size and density is presented with approximately the same strength on the display, inside the regulated TVG range. This can also be seen as a filter, because it reduces the noise close to the vessel.

The regulated strength of the TVG can be selected in the menu.

Related topics

- *Adjusting the Time Variable Gain (TVG)* on page 38
- *What is TVG?* on page 102

Noise filter

The noise filter is designed to remove unwanted acoustic noise from the sonar picture.

It will reduce the interference from other acoustic systems (sonars and echo sounders) on your own vessel and from other vessels in the vicinity. It will also suppress the noise from your own propellers and from other similar noise sources.

Support information

If you need technical support for your Simrad SH90 you must contact your local dealer, or one of our support departments. A list of all our dealers is provided on http://www.simrad.com.

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Getting started

This chapter describes how to get started with the basic operation of the Simrad SH90.

It contains a brief overview of the basic system operation and procedures. If you are a first time user, we recommend that you read through this chapter while operating the Simrad SH90 so that you can familiarize yourself with the menus, dialog boxes and display presentations.

Topics

- *Operating Panel* on page 22
- *Power on/off procedures* on page 22
- *Operating principles* on page 25
- *Starting normal operation* on page 31
- *Typical parameter settings* on page 39
- *Echo presentations* on page 42
- *Visual aids and cosmetics* on page 49
- *Online help* on page 56

Related topics

- *Operational procedures* on page 58

Operating Panel

The Operating Panel is the primary means of user interface to access the SH90 functionality.

The most frequently used functions are directly available using the designated control buttons on the Operating Panel. You can enter operational commands directly by the push of a button. To use the functions provided by the menu system, use the trackball and **Select**, **View** and **Object** buttons. These three buttons correspond to the three buttons on a standard computer mouse.

The buttons on the Operating Panel are grouped in fields according to their purpose.

A **Main switch**: Power the sonar on (and off), lower and hoist the transducer

B **Symbol**: Control the target markers providing exact latitude and longitude positioning.

C **Mode**: Select your favourite presentation mode or user setting with the push on a button.

D **Gain**: Separate gain control for horizontal and vertical sonar presentation.

E **Range**: Separate range control for horizontal and vertical sonar presentation.

F **Cursor**: Menu and cursor control.

G **Tilt**: Easy control of the sonar's tilt angle, or start automatic search program.

H **Various**: Store interesting screen captures, and zoom in on details.

I **Train**: Manual control of beam training, start automatic search and tracking programs.

Power on/off procedures

These procedures explain how to switch the SH90 system on and off.

The operation is made using the buttons on the Operating Panel.

Topics

- *Powering up the SH90* on page 22
- *Powering off the SH90* on page 24

Powering up the SH90

Purpose

This procedure explains how to power up the Simrad SH90.

Note

Make sure that you have sufficient water below the hull before you lower the SH90 transducer!

Procedure

1 Press the **Power** button on the colour display.

2 Press the **Power** button on the Operating Panel, and keep it depressed for approximately two seconds.

The green lamp on the right side of the button will flash to indicated that the power has been switched on, and that the computer is starting up.

After a short period you will see the sonar picture on the display.

Note

If the sonar system has been disconnected from AC power, the Processor Unit must be started manually. Use the on/off switch behind the lid on the front panel.

3 Check that the water depth beneath the keel is sufficient to lower the transducer.

4 Press the **Down** button on the Operating Panel to lower the transducer.

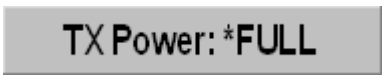
The green lamp next to the button will flash, and an audible signal indicates that the transducer is lowered.

When the lower position has been reached, the lamp will be lit continuously, the audible signal stops, and the top button in the **Status** parameter dialog shows **Transducer:Down**.

Note

*By default the transmit power is disabled when the sonar is powered up. This is for safety reasons. On the **Horizontal** menu, you will see that the **TX power** button flashes to remind you of this.*

5 On the **Horizontal** menu, click **TX power** to select **Full**.



Tip

The sonar will start up even if circuit boards in the Transceiver Unit are malfunctioning. The sonar will then need more time to perform the start-up procedure, and a short message will be provided above the progress bar.

System ready for ping, but with reduced number of TRH32

After the sonar has started up, the **TRU On/Off** dialog can be opened by clicking the **TRU On/Off** button on the **Test** menu. Click the **Advanced** button to obtain more information.

Powering off the SH90

Purpose

This procedure explains how to power off the Simrad SH90.

Procedure

1 Press the **Up** button on the Operating Panel.

The green lamp next to the button will flash, and an audible signal indicates that the transducer is hoisted.

When the upper position has been reached, the lamp will illuminate continuously, the audible signal stops, and the upper button in the **Status** menu shows **Transducer: UP**.

2 Press the **Power** button on the Operating Panel, and keep it depressed for approximately two seconds.

The sonar is switched off. Note that you must not use the green button on the Processor Unit, only this **Power** button on the Operating Panel.

Tip

If you forget to hoist the transducer before you press the **Power** to switch off the SH90, it will hoist the transducer automatically. You must then wait some extra time before the sonar switches off.

If the sonar is switched off uncontrolled with the transducer in its lowered position, the transducer will normally be hoisted automatically after approximately one minute. You must however verify that this takes place. If the transducer is not hoisted automatically, it can be raised manually by means of the hoist/lower switch in the Motor Control Unit. If mains power is lost, you can also use the hand crank provided.

3 Switch off the colour display.

Operating principles

The SH90 is operated using the dedicated Operating Panel. An optional mouse (or trackball) can also be connected.

Topics

- *Controlling the cursor* on page 25
- *Understanding the menu button principles* on page 26
- *Changing a parameter value* on page 27
- *Understanding the menu structure* on page 28
- *Investigating the echo presentation and menu* on page 29

Important

In this manual, the phrase “click” means that you shall place the cursor over the specified button, field or function, and press the **Select** button on the Operating Panel (or the left mouse button) once. The phrase “double-click” means that you shall press the **Select** button (or the left mouse button) twice rapidly.

The phrase “press” means that you shall press a physical button with your finger, this is typically any button on the Operating Panel.

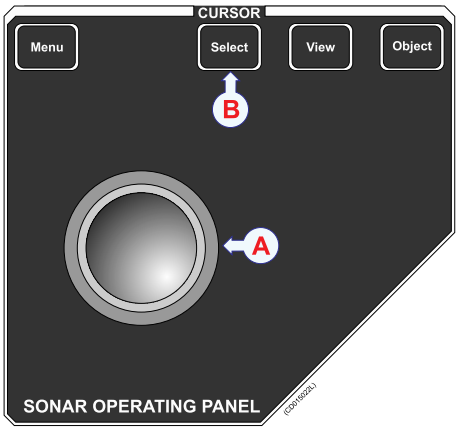
Controlling the cursor

Purpose

This procedure explains how to use the trackball and adjacent buttons to control the display cursor. You use the cursor and these buttons to access the functions provided by menu system, and to open the shortcut menus.

Tip

The trackball and the **Select** button corresponds to a standard computer mouse with its left mouse button.

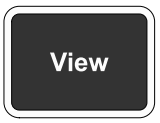


Procedure

1. Use the trackball (**A**) on the Operating Panel.
2. Observe that the cursor moves on the SH90 display, and that it changes its form depending on its location.
3. Observe the location of the **Select** button (**B**).
4. Place the cursor over a button on the menu, and press the **Select** button to activate the selected function.
5. Place the cursor in the echo presentation, and press the **View** button.

6 Observe that a dedicated **View** shortcut menu opens.

Which menu that opens depends on the current presentation mode, and in which display field you the cursor was located when you pressed the **View** button.



Tip

You can open the same **View** shortcut menu by pressing the **Select** button twice rapidly.

The functions on the **View** shortcut menu are all related to the visual presentation.

7 Place the cursor in the echo presentation, and press the **Object** button.

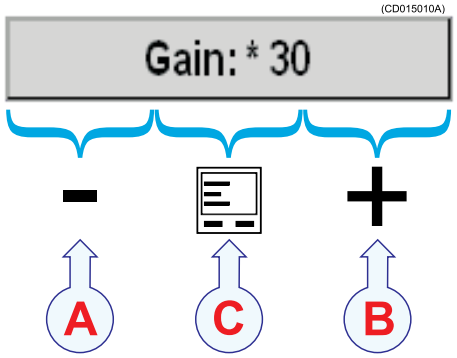
8 Observe that a dedicated **Object** shortcut menu opens.

The functions on the **Object** shortcut menu are all related to the objects you have defined, such as tracked targets or markers.

Understanding the menu button principles

Purpose

This procedure explains the operational principles of the menu buttons.



Each menu contains several buttons. Each button shows both the function and the current parameter. The majority of the buttons in each menu field have three functions:

- You can select a lower parameter value.
- You can select a higher parameter value.
- You can open the applicable parameter dialog at the bottom of the menu.

Procedure

1 Use the trackball on the Operating Panel, and position the cursor over the left side of the button (**A**).

Observe that the shape of the cursor changes to a “minus” sign. This means that the value of the parameter will decrease when you press the **Select** button on the Operating Panel.

Click on the left side of the button to decrease the parameter value

2 Position the cursor over the right side of the button (**B**).

Observe that the shape of the cursor changes to a “plus” sign. This means that the value of the parameter will increase when you press the **Select** button.

Click on the right side of the button to increase the parameter value

3 Position the cursor on the centre of the menu button (**C**).

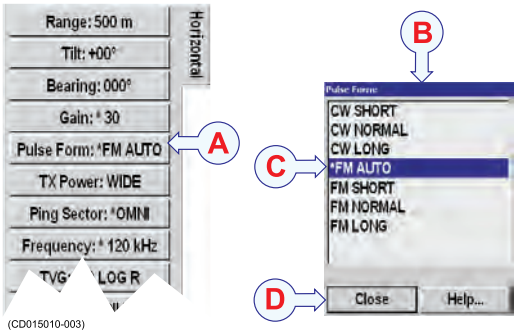
Observe that the shape of the cursor changes to a "menu" symbol. This means that the applicable parameter dialog will open when you press the **Select** button. The dialog appears in the lower part of the menu field, and offers an overview of the available options.

Click on the middle of the button to open the parameter dialog.

Changing a parameter value

Purpose

Observe this generic procedure to change a parameter value. Once you have gained more experience, and have become more familiar with the available options, you will select the parameters directly from the buttons.



Important

In this manual, the phrase "click" means that you shall place the cursor over the specified button, field or function, and press the **Select** button on the Operating Panel (or the left mouse button) once. The phrase "double-click" means that you shall press the **Select** button (or the left mouse button) twice rapidly.

The phrase "press" means that you shall press a physical button with your finger, this is typically any button on the Operating Panel.

Procedure

1 Move the cursor to the middle of the menu button (**A**). Observe that the cursor changes its shape to a menu symbol.

2 Press the **Select** button on the Operating Panel.

3 Observe that the corresponding parameter dialog (**B**) opens at the bottom of the menu.

4 Move the cursor down to the dialog, position the cursor over the requested parameter value (C), and press the **Select** button again.

Certain parameter settings are identified with an asterisk (*). This symbol indicates the default setting known to perform well under normal conditions. If you get "lost" in the parameter settings, the **Default settings** function will bring up these normal parameters. The **Default setting** function is available on the **Setup** menu, and a dedicated parameter dialog is used.

5 Observe that the change you have requested takes immediate effect on the sonar.

This makes it easy to test the effect of each parameter setting. Note however that transceiver related parameters will first be operational in the next ping.

6 Move the cursor down to the **Close** button (D) in the parameter dialog, and press the **Select** button again.

7 Observe that the parameter dialog closes.

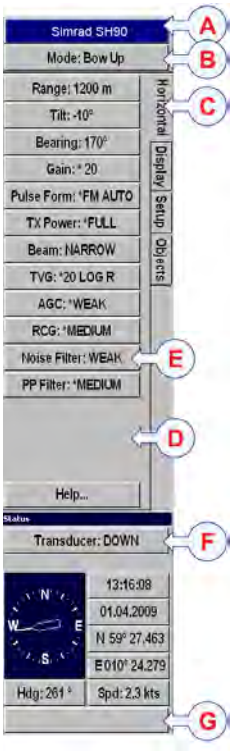
Tip

In the Simrad SH90, all parameters are stored automatically. This function will cause the SH90 to remember all the selected parameter settings, even when it is switched off.

Understanding the menu structure

Purpose

The menu contains several different buttons, tabs and parameter dialogs. Observe this procedure to familiarize yourself with the menu.



Procedure

1 Observe the blue field (**A**) at the top of the menu structure.

This is the **Sonar type**. This field simply states the name of the sonar.

2 Observe the second button (**B**) from the top.

This is the **Mode** button. It is present on the top of every menu.

Click this button to change presentation mode. If you click on the middle of the button you will open a dedicated menu for mode selection. If you click on the right or left side of the button you can scroll through the available modes.

3 Observe the vertical tabs on the right side of the menu body (**C**).

These are the **Tabs**, and they are used to bring forward the different menus.

Click on one of them to see the relevant menu.

4 Observe the main body of the menu (**D**).

This is the actual **Menu**. It contains a number of command buttons. Each menu provides a separate set of buttons. Some of them may have buttons that are unavailable in the present mode or system configuration.

5 Observe the buttons on the menu (**E**).

You can click on any **Button** to change the applicable parameter. If you click on the middle of the button you will normally open a dedicated parameter dialog for parameter selection. If you click on the right or left side of the button you can scroll through the available choices.

6 At the bottom of the menu, observe the **Parameter dialog** (**F**).

When you click a menu button, the relevant parameter dialog opens at the bottom of the menu. Each parameter dialog holds one or more buttons or menus. To close a parameter dialog, click the **Close** button.

Most dialogs provide a **Help** button for access to the on-line help. In this example you can see the **Status** dialog, which is replaced when a parameter dialog is opened.

7 At the very bottom of the menu system, observe the **Messages** (**G**).

The button at the bottom of the menu is used to provide relevant messages from the sonar system. The background colour changes to reflect the importance of the message.

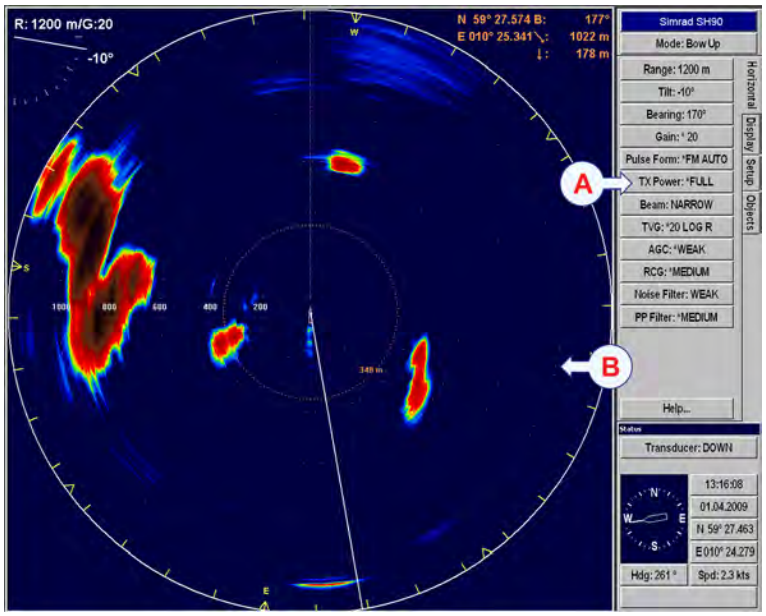
Investigating the echo presentation and menu

Purpose

The purpose of this procedure is to familiarize yourself with the menu and echo presentation area on the SH90.

Procedure

1 Once the SH90 is up and running, observe the layout of the display presentation:



On the right side, observe the menu system (**A**).

On the left side, observe the sonar echo presentation (**B**).

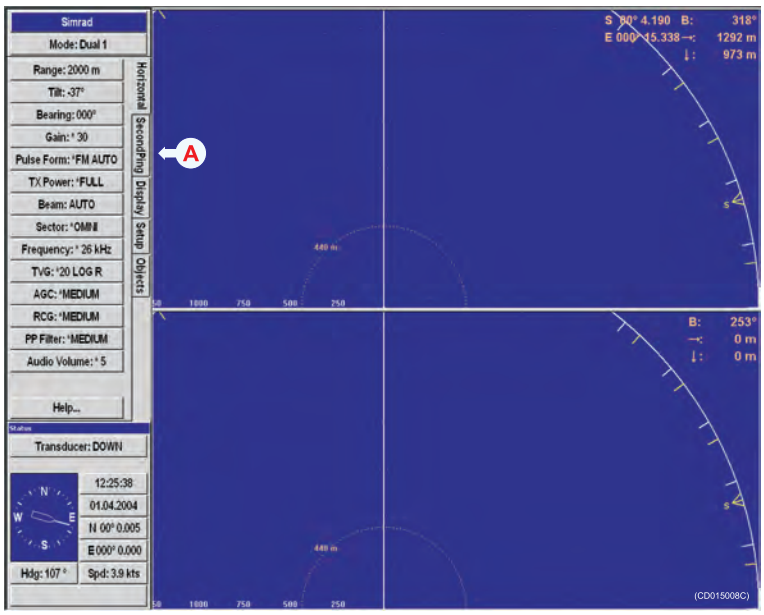
2 On the Operating Panel, press the **Menu** button (located above the large trackball).

3 Observe that the menu disappears from the display presentation.

When the menu is removed the echo presentation is extended to cover the entire display.

4 Use the trackball, and move the cursor over to the left or right side of the display.

5 Observe that the menu reappears on the selected side (**A**), and that the remaining echo presentation area is not re-scaled.



6 Move the cursor towards the centre of the display, and observe that the temporary menu disappears.

7 On the Operating Panel, press the **Menu** button one more time, and observe that the menu reappears.

Starting normal operation

Once you have powered up the complete SH90 system, you are ready to start the actual operation.

When started up, the SH90 will automatically apply its previous setup parameters.

Observe these brief procedures to familiarize yourself with the basic operations with echo presentations and menu operations.

Topics

- *Selecting the presentation mode* on page 31
- *Changing the menu language* on page 32
- *Changing the presentation colours* on page 32
- *Changing the operational range* on page 33
- *Adjusting the vertical and horizontal gain* on page 34
- *Changing the operational frequency* on page 35
- *Saving the current user settings* on page 36
- *Adjusting the Automatic Gain Control (AGC)* on page 36
- *Adjusting the Reverberation Controlled Gain (RCG)* on page 38
- *Adjusting the Time Variable Gain (TVG)* on page 38

Selecting the presentation mode

Purpose

Your SH90 sonar is equipped with several presentation modes. Observe these procedures to choose the mode best fit for your current operations.

Procedure

1 Basic procedure

a Locate the **Mode** field on your Operating Panel.

b Press one of the four buttons to choose presentation mode.

Using this method, you can only choose between the four modes predefined fort these buttons. Which modes to choose from are defined in the **Sort Modes** menu.

2 Alternative method

a Locate the **Mode** button on the top of each menu.

b Click **Mode** to choose presentation mode.

Click the left or right side of the **Mode** button to choose mode, or the middle of the button to open the parameter dialog.

Changing the menu language

Purpose

The menu system on your SH90 sonar is available in several languages.

Procedure

1 Click the **Display** tab to open the menu.

2 On the **Display** menu, click **Language**.

Use this function to choose the language used on the menu buttons.

3 Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Changing the presentation colours

Purpose

The echo presentation on your SH90 sonar can be provided using many colours and different palettes to suit your preferences.

Procedure

1 Click the **Display** tab to open the menu.

2 On the **Display** menu, click **Palette**.

This parameter allows you to choose a presentation colour palette to suit your personal preferences and the ambient light conditions.

3 Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

4 On the **Display** menu, click **Colours**.

This parameter allows you to control how bright colours you wish to use. The colour bar in the menu shows the colour range currently in use.

5 On the **Display** menu, click **Resolution**.

This parameter allows you to use 16 or 64 colours in the display presentation. This is a personal preference. The chosen resolution is shown in the colour bar below the button.

Changing the operational range

Purpose

The range of your SH90 sonar can be set individually for the horizontal and vertical presentations.

- The range applied to the horizontal presentation modes can be changed using the Operating Panel or the **Range** button on the **Horizontal** menu.
- The range applied to the vertical presentation modes can be changed using the Operating Panel or the **Range** button on the **Vertical** menu.

Note

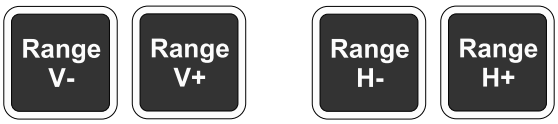
When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Procedure

1 Basic procedure

a Observe the **Range** field on the Operating Panel.

It provides separate gain controls for the horizontal and vertical sonar presentations.



b Press the **Range H-** and **Range H+** buttons to decrease or increase the horizontal range.

c Press the **Range V-** and **Range V+** buttons to decrease or increase the vertical range.

2 Alternative method: Horizontal range

a Click the **Horizontal** tab to open the menu.

b On the **Horizontal** menu, click **Range**.

This parameter is used to control the range of the SH90, that is the distance from the vessel to the outmost edge of the sonar beam.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

3 Alternative method: Vertical gain

a Click the **Vertical** tab to open the menu.

b On the **Vertical** menu, click **Gain**.

This parameter is used to control the range of the SH90, that is the distance from the vessel to the outmost edge of the sonar beam.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Adjusting the vertical and horizontal gain

Purpose

The range of your SH90 sonar can be set individually for the horizontal and vertical presentations.

- The gain applied to the horizontal presentation modes can be changed using the Operating Panel or the **Gain** button on the **Horizontal** menu.
- The gain applied to the vertical presentation modes can be changed using the Operating Panel or the **Gain** button on the **Vertical** menu.

Note

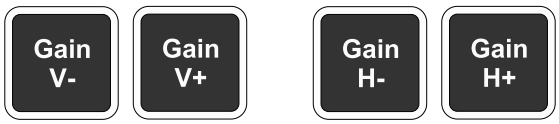
When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Procedure

1 Basic procedure

a Observe the **Gain** field on the Operating Panel.

It provides separate gain controls for the horizontal and vertical sonar presentations.



b Press the **Gain H-** and **Gain H+** buttons to decrease or increase the horizontal gain.

c Press the **Gain V-** and **Gain V+** buttons to decrease or increase the vertical gain.

2 **Alternative method**: Horizontal gain

a Click the **Horizontal** tab to open the menu.

b On the **Horizontal** menu, click **Gain**.

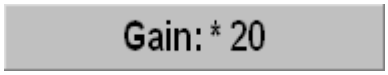
This parameter is used to control the receiver gain, that is how much amplification that is used on the received echoes.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

3 **Alternative method**: Vertical gain

a Click the **Vertical** tab to open the menu.

b On the **Vertical** menu, click **Gain**.



This parameter is used to control the receiver gain, that is how much amplification that is used on the received echoes.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Changing the operational frequency

Purpose

In addition to the standard 26 kHz frequency, you can select any operational frequency from 20 to 30 kHz in 1 kHz steps.

This is a very useful function when it is necessary to suppress interference from other sonars.

Note

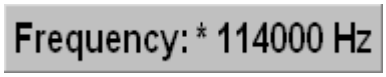
When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Procedure

1 **Operational frequency, horizontal**

a Click the **Horizontal** tab to open the menu.

b On the **Horizontal** menu, click **Frequency**.



This parameter is used to control the transmitter and receiver operational frequency.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

2 **Operational frequency, vertical**

a Click the **Vertical** tab to open the menu.

b On the **Vertical** menu, click **Frequency**.

This parameter is used to control the transmitter and receiver operational frequency.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Saving the current user settings

Purpose

All the parameter settings you make can be saved for later use.

Procedure

1 Click the **Setup** tab to open the menu.

2 On the **Setup** menu, click **User setting** button to open the parameter dialog.

This function allows you to save the current user settings (including parameter selections), and to retrieve previously saved factory or user settings.

3 Click the **Save current setting** button.

The current setting is saved with the default identification name.

Adjusting the Automatic Gain Control (AGC)

Purpose

The AGC (Automatic Gain Control) function adjusts the gain using an image processing algorithm. This processing depends on the strength of the incoming echo signal. The image is analyzed, and reverberation and echoes are identified. Based on the analysis, weak echoes are amplified, while strong echoes are reduced. The result is a “normalizing” effect that reduces noise and reverberation. The AGC is functional up to

the sonar's maximum range. As show in the menu, the AGC has four different settings. These settings define the difference between the maximum and minimum echo level for the filter to take effect.

Note

When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Tip

The most practical way to use the AGC (Automatic Gain Control) is to first switch it off. Adjust the echo presentation using the gain until you have the best possible result, then activate the AGC.

The AGC works best with even background (homogenous noise conditions) and pronounced targets. With uniform sonar conditions you may benefit from strong AGC compensation. However, if you are looking at scattered fish, reduce the AGC, and try to add gain instead.

If you work close to other vessels, the noise from their propellers may be misinterpreted as echoes. This will also reduce the visibility of other echoes. Reduce the AGC. The same applies if the bottom conditions place your vessel with decreasing depth on one side of the vessel and your targets on the other side.

If you have very strong echoes from a large school located close to your vessel (typically closer than 150 meters), we recommend that you reduce or switch off the AGC. This is because the AGC filter misinterprets the school for noise.

Keep in mind that the filters in the SH90 are implemented in "series". The gain compensations are made before the AGC. For this reason, your gain setting will always have an effect on the AGC.

Related topics

- *What is AGC?* on page 102

Procedure

1 Click either the **Horizontal** or **Vertical** tab to open the respective menu.

2 Observe the **AGC** button.

3 Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Adjusting the Reverberation Controlled Gain (RCG)

Purpose

The Reverberation Controlled Gain (RCG) regulates the receiver gain individually for each of the receiving beams.

The RCG filter will enhance the visibility of schools, and reduce the reverberation from bottom and surface echoes.

Scattered fish can be perceived as reverberation. The RCG function must therefore be used with care if scattered schools are to be detected.

Note

When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Tip

We recommend that the RCG is active all the time, but be careful in the vertical presentation. The Reverberation Controlled Gain (RCG) works best on small schools.

Setting “1” is intended for schools. Setting “2” is made for schools with higher density. Try “3” for schools close to bottom, as this setting will also reduce the bottom echoes.

If you are looking for scattered fish, use RCG setting “4” or “5”.

Settings “6” and “7” are also intended for schools, while ”8” and “9” can be used on scattered fish. These settings use alternative algorithms.

Related topics

- *What is RCG?* on page 105

Procedure

1 Click either the **Horizontal** or **Vertical** tab to open the respective menu.

2 Observe the **RCG** button.

3 Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Adjusting the Time Variable Gain (TVG)

Purpose

This parameter allows you to choose the Time Variable Gain setting in the SH90. This function will automatically adjust the gain in the SH90 to compensate for geometric spreading and absorption.

Note

When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Tip

For scattered fish, we suggest that you use the **40 log R** setting. For small schools, try **30 log R**, for large schools, use **20 log R**. If you use **20 log R** the bottom will always be presented with the same echo strength.

If you wish to examine weak echoes very close to your vessel, you may wish to use **10 log R** or **5 log R**, or turn off the TVG.

Keep in mind that the filters in the SH90 are implemented in "series". The TVG compensations are made before the AGC (Automatic Gain Control). For this reason, your TVG setting will always have an effect on the AGC.

If you disable the TVG compensation, maximum gain will be used on all ranges.

Related topics

- *What is TVG?* on page 102

Procedure

1 Click either the **Horizontal** or **Vertical** tab to open the respective menu.

2 Observe the **TVG** button.

3 Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Typical parameter settings

The SH90 offers numerous parameter settings. Choosing the correct settings for each individual type of fisheries and species can be a challenge. In the following, we suggest a selection of typical parameter settings. We acknowledge that sea and weather conditions, vessel independent properties and personal preferences play a vital part when you "tune" your sonar for best performance. These settings have however proven to be efficient for several individual users, and may also serve you as a "base" for your own adjustments.

Topics

- *Setting the net* on page 40
- *Herring* on page 40
- *Pollock and saithe* on page 40
- *Blue whiting* on page 41

- *Mackerel* on page 41
- *Scattered fish* on page 41

Setting the net

Parameter	Horizontal beam	Vertical beam
Presentation mode	Bow Up / 270 Vertical	
Gain	17	17
Pulse form	FM Auto	FM Auto
Beam	Narrow	N/A
TVG	20 log R	20 log R
AGC	Medium	Weak
RCG	2	2
Noise Filter	Weak	N/A
PP Filter	Medium	Medium

Herring

Parameter	Horizontal beam	Vertical beam
Presentation mode	Bow Up / 270 Vertical	
Gain	20	17
Pulse form	FM Auto	FM Auto
Beam	Narrow	N/A
TVG	20 log R	20 log R
AGC	Medium	Weak
RCG	2	2
Noise Filter	Medium	N/A
PP Filter	Medium	Medium

Pollock and saithe

Parameter	Horizontal beam	Vertical beam
Presentation mode	Bow Up / 270 Vertical	
Gain	37	26
Pulse form	FM Short	FM Short
Beam	Normal	N/A
TVG	10 log R	10 log R
AGC	Off	Medium
RCG	4	4

Parameter	Horizontal beam	Vertical beam
Noise Filter	Medium	N/A
PP Filter	Medium	Medium

Blue whiting

Parameter	Horizontal beam	Vertical beam
Presentation mode	Bow Up / 180 Vertical	
Gain	17	17
Pulse form	CW Long	FM Auto
Beam	Narrow	N/A
TVG	40 log R	20 log R
AGC	Strong	Weak
RCG	4	Strong
Noise Filter	Medium	N/A
PP Filter	Medium	Medium

Mackerel

Parameter	Horizontal beam	Vertical beam
Presentation mode	Bow Up / 180 Vertical	
Gain	20	20
Pulse form	FM Auto	FM Auto
Beam	Narrow	N/A
TVG	20 log R	20 log R
AGC	Strong	Weak
RCG	4	4
Noise Filter	Weak	N/A
PP Filter	Weak	Weak

Scattered fish

Parameter	Horizontal beam	Vertical beam
Presentation mode	Bow Up / 270 Vertical	
Gain	20	20
Pulse form	FM Short	FM Short
Beam	Normal	N/A
TVG	20 log R	20 log R
AGC	Weak	Medium

Parameter	Horizontal beam	Vertical beam
RCG	4	4
Noise Filter	Medium	N/A
PP Filter	Medium	Medium

Echo presentations

The information provided by the SH90 is presented in individual views. Basically, three different views are used.

- Omni presentation (horizontal)
- Vertical slice presentation
- Catch data presentation

The size of each view can easily be adjusted.

Topics

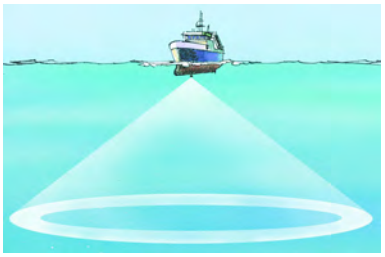
- *Investigating the omni presentation* on page 42
- *Investigating the vertical slice presentation* on page 45
- *Investigating the catch data presentation* on page 47

Related topics

- *Presentation modes* on page 82

Investigating the omni presentation

Purpose



Observe this procedure to familiarize yourself with the omni presentation provided by the SH90. The presentation can be arranged in three different ways.

1 *True mode*, in which the picture is locked to a geographical position, and the vessel moves around the screen according to its present course and speed.

2 *Bow up*, in which the vessel symbol is stationary on the screen with the bow pointing upwards.

3 *North up*, in which the vessel symbol is stationary on the screen with true north always up.

When the *Omni* beam is tilted, the total beam picture can be compared with folding an umbrella, which means that all beams in 360 degrees around the vessel have the same tilt angle.

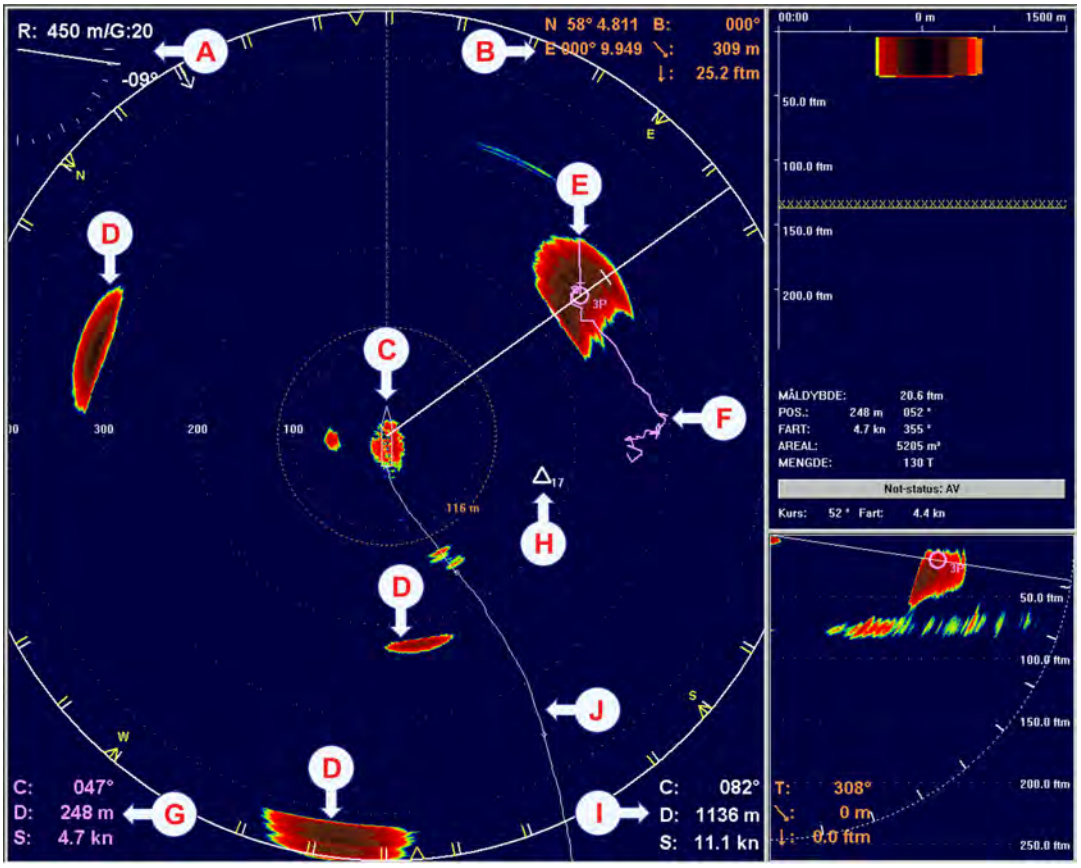
In several presentation modes, the omni presentation is combined with a vertical slice, and/or with a catch data presentation.

Procedure

1 Locate the **Mode** button on the top of each menu.

2 Click **Mode** to choose presentation mode *Bow Up/Vertical*.

3 Observe the omni presentation, and compare it with the example provided.



This screen capture has been taken from an SX90 sonar working on a Norwegian fishing vessel somewhere in the North Sea. The *Bow Up/Vertical* mode is used, and several distinctive schools can be seen.

A The information in the top left corner shows the current range, gain and tilt settings.

B The information in the top right corner shows the location of the cursor. The depth of the cursor is calculated based on the selected tilt and the distance from your own vessel.

C In this mode, the vessel is placed at the centre of the omni presentation with the ship's head pointing straight up. The compass rose on the outer presentation circle will move to reflect the heading, observe the N, E, S and W characters to identify the compass bearings.

The echoes immediately under and around the vessel symbol are noise from the water passing the hull.

D Not all fish schools are interesting for the skipper. The three schools identified are obviously too small.

E This is the school of fish that the skipper is interested in. He has placed a target track on it (3P) indicating that this is target no 3, and that this is his priority target. The audio channel (the white line) is automatically placed on this priority target, this allows you see the same school in the vertical slice presentation.

F The line after the target shows the movement history of the target (school of fish). The vertical line pointing up from the target track symbol indicates the target's calculated course (direction) and speed (length).

G The information in the bottom left corner provides the target's bearing and distance (relative to the ship) and its speed. If you click on the target symbol, the information will also appear in the parameter dialog under the menu.

H The triangle identified as “17” is a standard marker.

I The information in the bottom right corner provides the course, depth and speed of the latest marker relative to the previous marker. Marker 17 is shown here, and the current information is then relative to the position of marker 16. This information is provided when you first establish the latest marker. It will thus remain unchanged even if you move marker 17 manually.

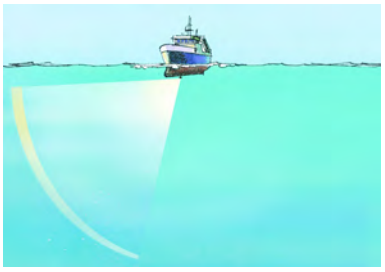
J The white line shown after the ship symbol indicates the previous movements of your vessel.

Related topics

- *Visual aids and cosmetics* on page 49
- *Markers and symbols procedures* on page 66

Investigating the vertical slice presentation

Purpose



Observe this procedure to familiarize yourself with the vertical slice presentation provided by the SH90.

In addition to seeing the target from above, it is also possible to see the target from the side, by using the vertical slice presentation. In this case the beam covers a continuous vertical beam from 0 to -60 degrees in one transmission.

This vertical slice, which is presented by the white bearing line (also referred to as the "audio line") in the horizontal picture, can be selected to any bearing by the manual training control.

In addition to the *Omni* picture, the vertical slice is especially useful for visualizing the vertical distribution of a school of fish. In that way, it is not necessary to go over the target to see the distribution on the echo sounder, which often results in a spreading of the school.

Important

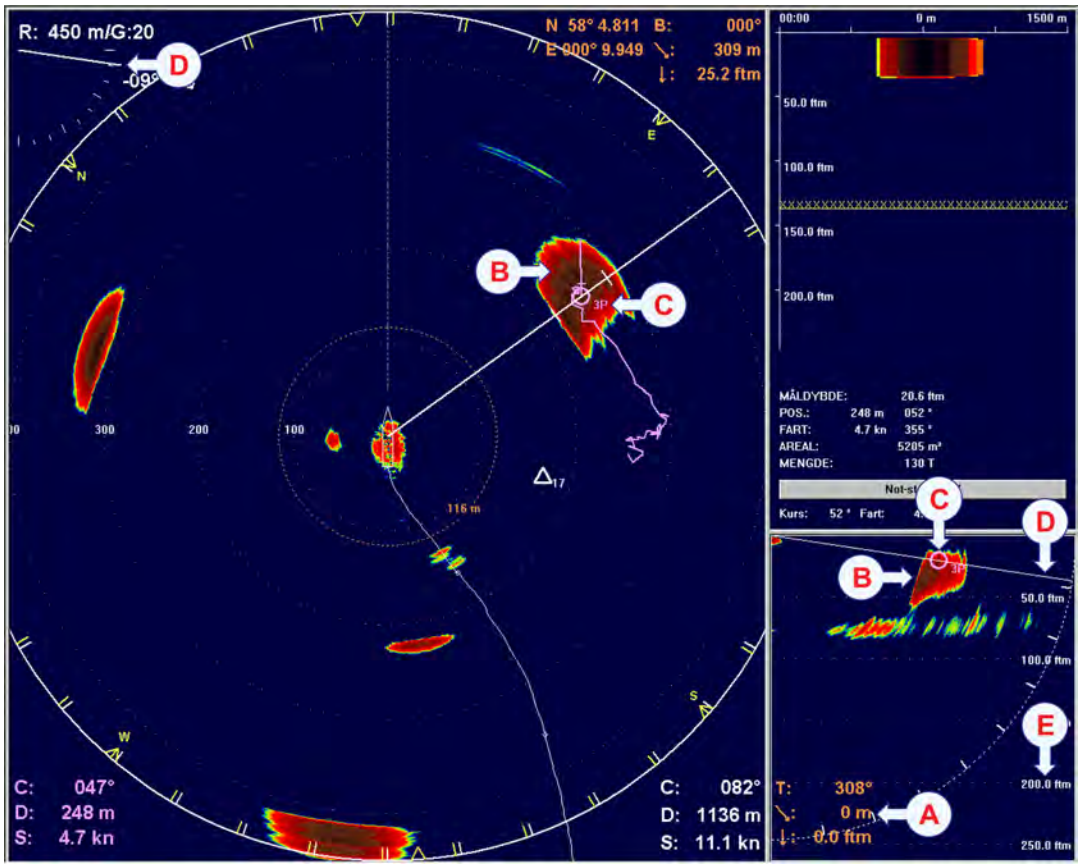
Note that this view is by default located on the right hand side of the SH90 presentation, and often hidden behind the menu. In order to see the view, press the **Menu** button on the Operating panel, or click the **Full Screen:On** button on the **Display** menu.

Procedure

1 Locate the **Mode** button on the top of each menu.

2 Click **Mode** to choose presentation mode *Bow Up/Vertical*.

3 Observe the vertical slice presentation, and compare it with the example provided.



This is the same screen capture one more time, but this time with focus on the vertical view in the bottom right corner. Note that the vertical view is made along the white audio line in the omni presentation.

A This information at the bottom left corner of the vertical views provides the tilt, distance and depth of the cursor.

The information is only valid when the cursor is located within the view. Once you move it outside, any spurious values may be displayed.

B This is the same target as shown in the omni presentation. In the vertical view, however, you see it sideways, like on an echo sounder. Note the appearance of the bottom below the main school. The bottom can not be seen in the omni presentation due to the reverberation filtering.

C This is the school of fish that the skipper is interested in. He has placed a target track on it (3P) indicating that this is target no 3, and that this is his priority target. The same information is provided by the omni presentation.

D This line indicates the current tilt. This is the same information as in the top left corner of the omni presentation.

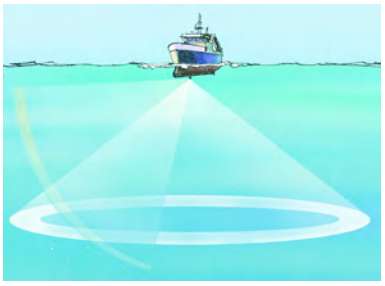
E These are the depth lines in the vertical presentation. They are used to indicate how deep the various targets are located. The units can be changed in the **Units** parameter dialog.

Related topics

- *Hiding (and retrieving) the menu* on page 59

Investigating the catch data presentation

Purpose



The combination of the Omni mode and the vertical slice will give an optimal visualization of the catch situation. Observe this procedure to familiarize yourself with the catch data presentation provided by the SH90.

The *Catch Data* view is only available in the following presentation modes:

- Bow up/Vertical
- True motion/Vertical
- 270°/Vertical

The purpose of this view is to offer information related to the catch phase.

There are two catch data presentation modes, depending on the gear you have chosen in the **Gear** dialog on the **Setup** menu. The screen capture shown here reflects a purse seine.

Important

Note that this view is by default located on the right hand side of the SH90 presentation, and often hidden behind the menu. In order to see the view, press the **Menu** button on the Operating panel, or click the **Full Screen:On** button on the **Display** menu.

Note

In order to see the echo in the Catch Data view, you must start a target track on the chosen target (school).

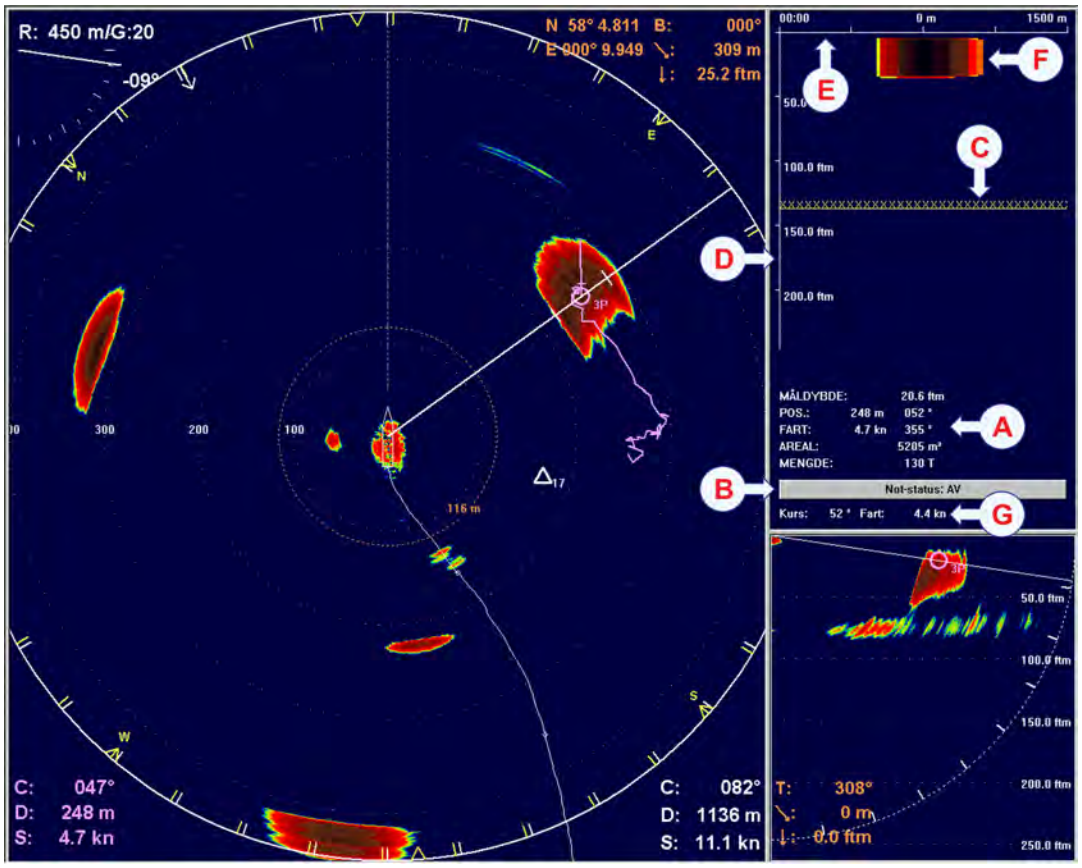
Procedure

1 Locate the **Mode** button on the top of each menu.

2 Click **Mode** to choose presentation mode *Bow Up/Vertical*.

3 Choose any echo on the sonar presentation, place the cursor on top of the echo, and press the **Target Track** button on the Operating Panel to start a target track.

4 Observe the catch data presentation, and compare it with the example provided.



This is the same screen capture one more time, but this time with focus on the catch data presentation in the top right corner.

A This information at the bottom left corner of the catch data presentation provides data related to the target. You can read its depth, position, movements, area and the estimated volume of fish.

The quantity of fish depends on the parameters you have entered in the **School** dialog on the **Setup** menu.

B This **Net state** button is only available if you use a purse seine. It initiates the catch sequence, in which the SH90 can be used in a "tactical mode". In this mode, the purse seine is indicated as a yellow circle on the omni presentation.

If you use a trawl, this button is replaced with a temperature read-out. This information however assumes that you have the applicable sensors connected to the SH90.

C This line of yellow X'es indicate the height of the purse seine. This is the depth you have defined in the **Gear** dialog on the **Setup** menu. It is thus a fixed value, and it is not visible when you use a trawl.

D The vertical axis of the catch data coordinate system specifies the depth. The range is defined in the **CatchView** menu. By default, the depth range is automatic, but you can override this in the **Range** parameter dialog.

To open the **CatchView** menu, press the **View** button on the Operating Panel, or the middle mouse button, when the cursor is located in the *Catch data* view. Then, click **View Menu** in the **View** pop-up menu.

E The information provided at the top of the view depends if you use a trawl or a purse seine.

With a purse seine (as shown in the screen capture), the horizontal line at the top of the presentation does not by itself offer any information. However, the digits shown above it are important.

- The left digits are a timer. It will measure the time elapsed since you "shot" the purse seine. The timer starts when you click the **Net state** button to change its status from *Ready* to *Shot*.
- The middle digits measures the length of the purse seine that you have released. As the length increases, a yellow bar provides a visual presentation. The current depth of the footrope is also shown with in yellow.
- The right digits reflect the total length of the purse seine. This is the length you have defined in the **Gear** dialog on the **Setup** menu. It is thus a fixed value.

With a trawl, the horizontal line is used as a reflect the course of the trawl. If you have an ITI system connected to the SH90, a trawl symbol will be shown to indicate the position of the trawl opening relative to the target. You can then easily manoeuvre your vessel to obtain the best possible catch.

F This is the echo from your target. It is shown as in a vertical slice, which means that it vertical position in the view reflects its actual depth. The echo appears smaller than in the vertical slice presentation because the beam width is only 11 degrees.

G This information shows the course and speed of your own vessel.

Related topics

- *Hiding (and retrieving) the menu* on page 59
- *Enabling target track* on page 76

Visual aids and cosmetics

The sonar display contains not only the sonar picture and the menu system, but also other information that is useful for efficient operation.

Topics

- *Investigating the common information on the display* on page 50
- *Moving the boundary lines* on page 50
- *Adjusting the variable range marker* on page 51
- *Moving the bearing (audio) line* on page 51
- *Modifying the amount of visual aids (cosmetics) on the presentation* on page 53
  - *Cosmetics: Bearing Card, Wind Marker and Distance Rings* on page 54
  - *Cosmetics: Variable Range Marker, Compass Card and Vertical Ring* on page 55
  - *Cosmetics: Depth Dividers, Minute Markers and Bow Marker* on page 56

Investigating the common information on the display

Purpose

Observe this procedure to familiarize yourself with the common information provided at the top of the SH90 presentation.

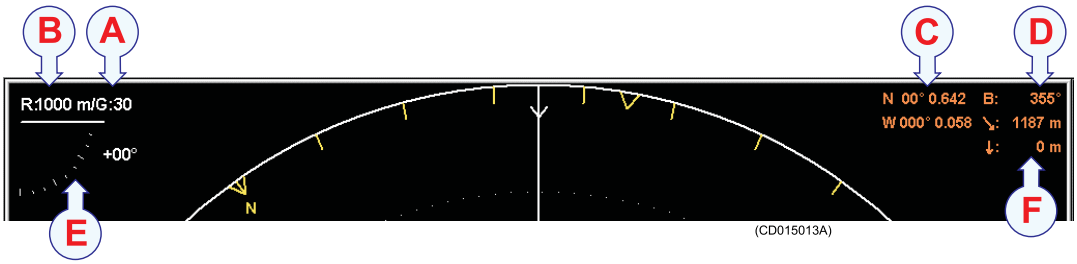
Procedure

1 Locate the **Mode** button on the top of each menu.

2 Click **Mode** to choose presentation mode *True Motion*.

3 Observe the information provided on the top of the presentation.

In nearly all presentation modes, the following information is provided.



A *Current horizontal gain.*

B *Current horizontal range.*

C *The cursor's current geographical position (provided that the necessary sensor is connected to the sonar).*

D *The cursor's current bearing relative to the vessel or true north.*

E *Current tilt.*

F *Current range and depth of the cursor position.*

Moving the boundary lines

Purpose

In most presentation modes with multiple views, the size of each view can easily be modified by moving the boundary line between the views. Observe the following procedure.

Procedure

1 Place the cursor on the boundary line. Observe that it changes its shape to a double arrow (↔).

2 Press and hold the **Select** button on the Operating Panel (or the left mouse button)

3 Move the cursor with the **Select** button depressed. Observe that the boundary line is moved.

4 Release the **Select** button.

5 Observe that the boundary line has been relocated to the new cursor position.

Adjusting the variable range marker

Purpose

The Variable Range Marker (VRM) consists of an adjustable range ring with range read-out. It can be used for any type of distance marking relative to the vessel.

Procedure

1 Click the **Display** tab to open the menu.

2 Click the **Cosmetics** button to open the **Cosmetics** menu.

This menu allows you to control the amount of support information on the SH90 presentation.

3 Click the **VRM** button to activate the variable range marker.

A red dotted circle is shown on the sonar presentation. The range from the center (vessel) is indicated in the lower right quadrant of the circle.

4 Place the cursor anywhere on the dotted line.

5 Press and hold the **Select** button on the Operating Panel (or the left mouse button)

6 Move the cursor to increase or decrease the diameter of the circle.

7 Release the **Select** button to lock the variable range marker to its new size.

Moving the bearing (audio) line

Purpose

The bearing line is shown as a while line starting at the center of the omni presentation (vessel) and stretching out to the outer circle. The bearing line serves several important purposes.

- It shows you the bearing to a selected target
- When you a using a presentation mode with a vertical slice, the bearing line defines the direction of the vertical view.

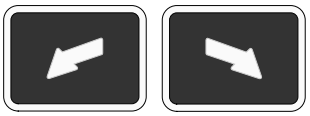
Tip

The white Bearing line is also frequently referred to as the “Audio line”.

Procedure

1 Basic procedure

a Observe the **Train** field on the Operating Panel.



It provides two separate buttons to move the bearing line.

b Press either of the two buttons to change the direction of the bearing line.

2 Alternative method 1

a Place the cursor anywhere on the bearing line.

b Press and hold the **Select** button on the Operating Panel (or the left mouse button)

c Move the cursor to change the direction of the bearing line.

d Release the **Select** button to lock the bearing line to its new direction.

3 Alternative method 2

a Click the **Horizontal** tab to open the menu.

b On the **Horizontal** menu, click **Bearing**.

This parameter is – when opened from the **Horizontal** menu – used to control the bearing of the horizontal sonar beam.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Modifying the amount of visual aids (cosmetics) on the presentation

Purpose

The choices in the **Cosmetics** menu allows you to enable or disable a range of visual aids in the sonar picture.

Procedure

1 Click the **Display** tab to open the menu.

2 Click the **Cosmetics** button to open the **Cosmetics** menu.

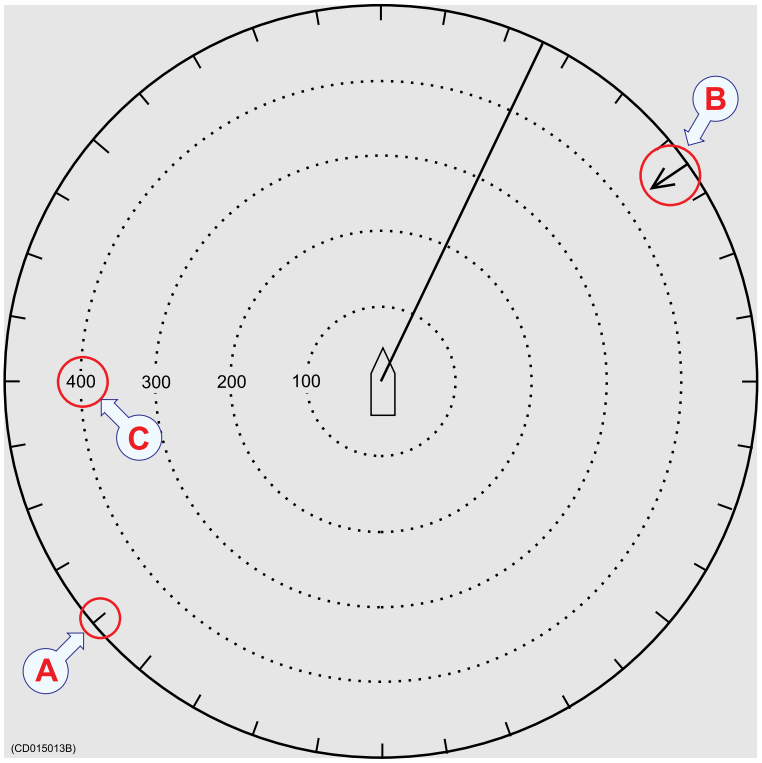
This menu allows you to control the amount of support information on the SH90 presentation.

3 Observe a range of parameters available to provide you with additional information on the sonar picture.

Cosmetics: Bearing Card, Wind Marker and Distance Rings

Bearing Card

The **Bearing Card** (A) shows the current bearing relative to the vessel. The markers are shown as short white lines for every 10th degree along the outer circle of the sonar view.



Bearing Card (A), Wind Marker (B) and Distance Rings (C)

Wind Marker

The **Wind Marker** (B) is shown as an arrow drawn from the Compass card pointing towards the centre of the display. If a wind sensor is connected to the sonar, it will automatically show the current wind direction. Otherwise, the wind direction may be entered manually. The arrow has a fixed length, it is not scaled according to the current wind speed.

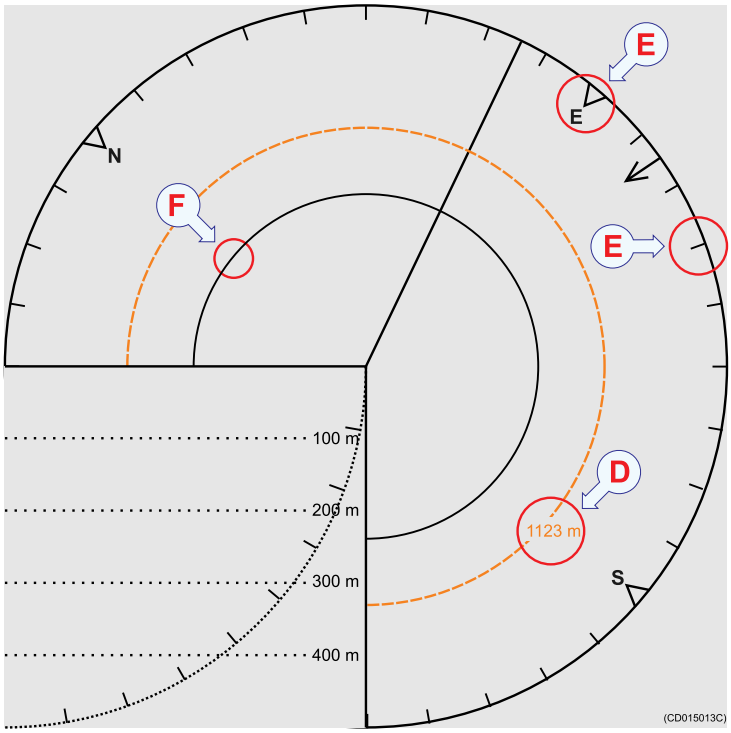
Distance Rings

The **Distance Rings** (C) are shown as dotted rings, each with a range read-out on the left hand side of the display centre.

Cosmetics: Variable Range Marker, Compass Card and Vertical Ring

Variable Range Marker (VRM)

The **Variable Range Marker (VRM)** (D) consists of an adjustable range ring with range read-out. It can be used for any type of distance marking relative to the vessel. To adjust the marker, locate the cursor on the marker ring, press the **Select** on the Operating Panel, and move the cursor with the **Select** button depressed. When the button is released, the variable range marker radius will be locked to the new position.



Variable Range Marker (D), Compass Card (E) and Vertical Ring (F)

Compass Card

The **Compass Card** (E) is shown as short yellow lines for every 10th degree along the outermost circle of the sonar view. A triangle symbol indicates each 90th degree. It has labels indicating North, East, South and West. It is updated when the heading of own ship has changed more than 1 degree.

Vertical Ring

The **Vertical Ring** (F) shows the selected range of the vertical slice as a full circle in the horizontal presentation. This is an indication of which distance a target should be presented in the vertical view. The Vertical Ring will only be visible in those modes that support a vertical slice.

Cosmetics: Depth Dividers, Minute Markers and Bow Marker

Depth Dividers

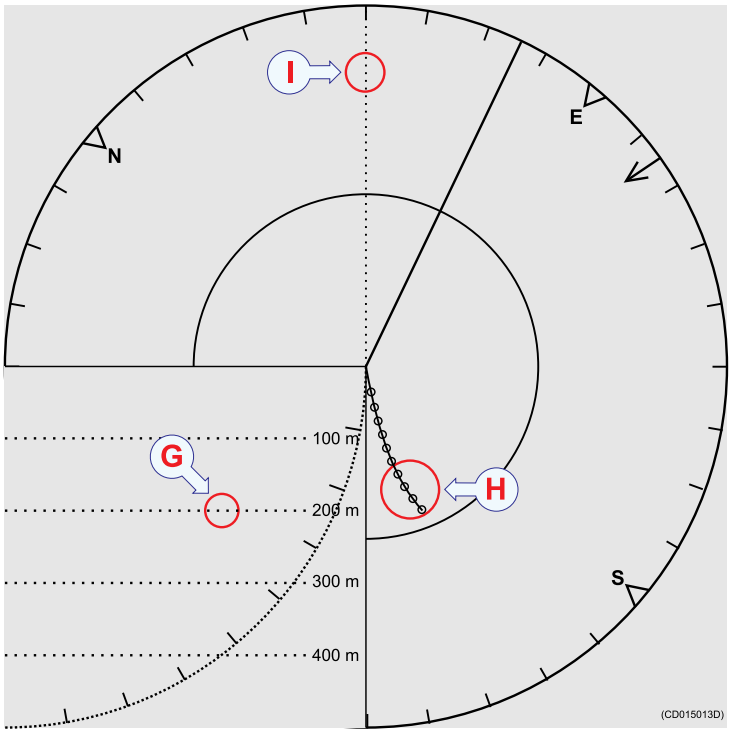
The **Depth Dividers** (G) are horizontal dotted lines used to visualize the depth steps in the vertical slices.

Minute Marker

The **Minute Markers** (H) are shown as small circles on the track history of the ship.

Bow Marker

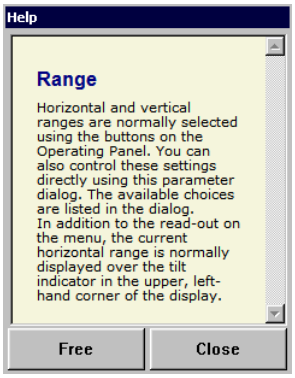
The **Bow Marker** (I) is heading marker. It is a dotted line drawn from the bow of your own ship.



Depth Dividers (G), Minute Markers (H) and Bow Marker (I)

Online help

Purpose


Help
Range
Horizontal and vertical ranges are normally selected using the buttons on the Operating Panel. You can also control these settings directly using this parameter dialog. The available choices are listed in the dialog.
In addition to the read-out on the menu, the current horizontal range is normally displayed over the tilt indicator in the upper, left-hand corner of the display.
Free
Close

The Simrad SH90 sonar is equipped with a comprehensive context sensitive online help system. Help is provided in two levels;

- *On-line* and
- *Free*

The help system is available from all the parameter dialogs and menus by clicking the **Help** button.

Important

The online help is only available in English.

Procedure

1 Click the **Horizontal** tab to open the menu.

2 Click the middle of the **Range** button to open the parameter dialog.

3 In the parameter dialog, click the **Help** button.

Once pressed, the first help text will appear in the bottom of the menu. This is the *On-line* text. It is short, context sensitive, and designed not to interrupt the operation of the sonar.

4 In the help dialog, click the **Free** button.

This will open the complete interactive manual. It contains the same information as the printed *SH90 Reference Manual*, but the information is made available using the menu on the left hand side and interactive links throughout the document.

5 Click **Free** in the bottom left corner to return to the small on-line parameter dialog.

Important

If you click **Close** button to close the large interactive manual window (Free), this view will automatically reappear the next time you click a **Help** button.

6 In the help dialog, click the **Close** button.

Operational procedures

This chapter contains several operational procedures explaining how you can put your Simrad SH90 to use.

Are there any procedures missing? Are you performing an operation that we have not explained? Write an e-mail to simrad.support@simrad.com and let us know. We may then include the procedure in the next version of this manual.

Topics

- *Menu procedures* on page 59
- *Gain and filter adjustment procedures* on page 60
- *Mode procedures* on page 65
- *Markers and symbols procedures* on page 66
- *Storage procedures* on page 69
- *Automatic search and tracking procedures* on page 74
- *User setting procedures* on page 77

Menu procedures

This section provides general procedures for menu handling.

Topics

- *Hiding (and retrieving) the menu* on page 59
- *Simplifying the menu system with fewer buttons* on page 59

Hiding (and retrieving) the menu

The menu is normally located on the right hand side of the display presentation, but if you don't need it, you can easily remove it.

1 Basic procedure

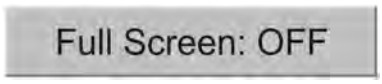
a Press the **Menu** button on the Operating Panel.

The **Menu** button acts as a toggle switch. Press once to remove the menu, and one more time to retrieve it.

2 Alternative method

a Click the **Display** tab on the sonar menu.

b Click the **Full screen: OFF** button.



3 How to recall the menu

a Move the cursor to the far left or far right side of the display

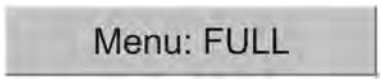
b Observe that the menu system appears. It can be shown on either side, and will not have any effect on the sonar presentation.

c Open the **Display** menu, and click **Full screen: ON**.

Simplifying the menu system with fewer buttons

This procedure explains how you can easily reduce the number of buttons on the sonar menus. This can be useful if you never use them.

1 Click the **Display** tab to open the **Display** menu.



2 Click the **Menu** button.

3 In the parameter dialog, select the menu level you wish to use.

4 Click **Close** to exit.

Gain and filter adjustment procedures

This section explains how to control the manual and automatic gain settings on the SH90 sonar.

Topics

- *Adjusting the vertical and horizontal gain* on page 60
- *Adjusting the Automatic Gain Control (AGC)* on page 61
- *Adjusting the Reverberation Controlled Gain (RCG)* on page 62
- *Adjusting the Time Variable Gain (TVG)* on page 63
- *Adjusting the display gain* on page 64

Adjusting the vertical and horizontal gain

Purpose

The range of your SH90 sonar can be set individually for the horizontal and vertical presentations.

- The gain applied to the horizontal presentation modes can be changed using the Operating Panel or the **Gain** button on the **Horizontal** menu.
- The gain applied to the vertical presentation modes can be changed using the Operating Panel or the **Gain** button on the **Vertical** menu.

Note

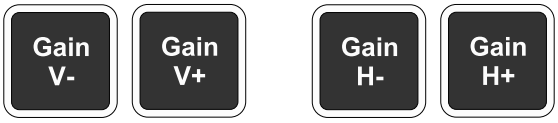
When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Procedure

1 Basic procedure

a Observe the **Gain** field on the Operating Panel.

It provides separate gain controls for the horizontal and vertical sonar presentations.



b Press the **Gain H-** and **Gain H+** buttons to decrease or increase the horizontal gain.

c Press the **Gain V-** and **Gain V+** buttons to decrease or increase the vertical gain.

2 **Alternative method**: Horizontal gain

a Click the **Horizontal** tab to open the menu.

b On the **Horizontal** menu, click **Gain**.

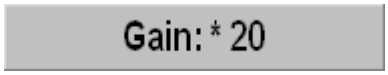
This parameter is used to control the receiver gain, that is how much amplification that is used on the received echoes.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

3 **Alternative method**: Vertical gain

a Click the **Vertical** tab to open the menu.

b On the **Vertical** menu, click **Gain**.



This parameter is used to control the receiver gain, that is how much amplification that is used on the received echoes.

c Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Adjusting the Automatic Gain Control (AGC)

Purpose

The AGC (Automatic Gain Control) function adjusts the gain using an image processing algorithm. This processing depends on the strength of the incoming echo signal. The image is analyzed, and reverberation and echoes are identified. Based on the analysis, weak echoes are amplified, while strong echoes are reduced. The result is a "normalizing" effect that reduces noise and reverberation. The AGC is functional up to the sonar's maximum range. As show in the menu, the AGC has four different settings. These settings define the difference between the maximum and minimum echo level for the filter to take effect.

Note

When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Tip

The most practical way to use the AGC (Automatic Gain Control) is to first switch it off. Adjust the echo presentation using the gain until you have the best possible result, then activate the AGC.

The AGC works best with even background (homogenous noise conditions) and pronounced targets. With uniform sonar conditions you may benefit from strong AGC compensation. However, if you are looking at scattered fish, reduce the AGC, and try to add gain instead.

If you work close to other vessels, the noise from their propellers may be misinterpreted as echoes. This will also reduce the visibility of other echoes. Reduce the AGC. The same applies if the bottom conditions place your vessel with decreasing depth on one side of the vessel and your targets on the other side.

If you have very strong echoes from a large school located close to your vessel (typically closer than 150 meters), we recommend that you reduce or switch off the AGC. This is because the AGC filter misinterprets the school for noise.

Keep in mind that the filters in the SH90 are implemented in “series”. The gain compensations are made before the AGC. For this reason, your gain setting will always have an effect on the AGC.

Related topics

- *What is AGC?* on page 102

Procedure

1 Click either the **Horizontal** or **Vertical** tab to open the respective menu.

2 Observe the **AGC** button.

3 Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Adjusting the Reverberation Controlled Gain (RCG)

Purpose

The Reverberation Controlled Gain (RCG) regulates the receiver gain individually for each of the receiving beams.

The RCG filter will enhance the visibility of schools, and reduce the reverberation from bottom and surface echoes.

Scattered fish can be perceived as reverberation. The RCG function must therefore be used with care if scattered schools are to be detected.

Note

When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Tip

We recommend that the RCG is active all the time, but be careful in the vertical presentation. The Reverberation Controlled Gain (RCG) works best on small schools.

Setting “1” is intended for schools. Setting “2” is made for schools with higher density. Try “3” for schools close to bottom, as this setting will also reduce the bottom echoes.

If you are looking for scattered fish, use RCG setting “4” or “5”.

Settings “6” and “7” are also intended for schools, while ”8” and “9” can be used on scattered fish. These settings use alternative algorithms.

Related topics

- *What is RCG?* on page 105

Procedure

1 Click either the **Horizontal** or **Vertical** tab to open the respective menu.

2 Observe the **RCG** button.

3 Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Adjusting the Time Variable Gain (TVG)

Purpose

This parameter allows you to choose the Time Variable Gain setting in the SH90. This function will automatically adjust the gain in the SH90 to compensate for geometric spreading and absorption.

Note

When this parameter is changed on a horizontal menu, the chosen setting is only put to use on the horizontal sonar presentation. If you change the parameter on a vertical menu, it is only applied to the vertical sonar slice presentation.

Tip

For scattered fish, we suggest that you use the **40 log R** setting. For small schools, try **30 log R**, for large schools, use **20 log R**. If you use **20 log R** the bottom will always be presented with the same echo strength.

If you wish to examine weak echoes very close to your vessel, you may wish to use **10 log R** or **5 log R**, or turn off the TVG.

Keep in mind that the filters in the SH90 are implemented in "series". The TVG compensations are made before the AGC (Automatic Gain Control). For this reason, your TVG setting will always have an effect on the AGC.

If you disable the TVG compensation, maximum gain will be used on all ranges.

Related topics

- *What is TVG?* on page 102

Procedure

1. Click either the **Horizontal** or **Vertical** tab to open the respective menu.
2. Observe the **TVG** button.

3. Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Adjusting the display gain

Purpose

This function controls the "amount" of echo that are displayed – the strength of the echo presentation on the display. Use this control together with **Gain** to control the SH90 sensitivity.

Tip

Adjust the display gain so that you can se the target without too much noise and reverberation on the screen. This is a matter of individual preference.

Procedure

1. Click the **Display** tab to open the menu.
2. Observe the **Display Gain** button.

3. Click either side of the button to leaf through the options, or the middle of the button to open the parameter dialog.

Mode procedures

This section explains how to choose presentation modes, and how to set up the **Mode** buttons on the SH90 Operating Panel.

Topics

- *Select presentation mode* on page 65
- *Defining the function of the Mode buttons on the Operating Panel* on page 65
- *Sorting the presentation modes* on page 66

Related topics

- *Presentation modes* on page 82

Select presentation mode

Your SH90 sonar is equipped with several presentation modes. Observe these procedures to choose the mode best fit for your current operations.

1 Basic procedure

a Locate the **Mode** field on your Operating Panel

b Press one of the four buttons to choose mode.

Note

Using this method, you can only choose between four modes. Which modes to choose from are defined by sorting the modes.

2 Alternative method

a Locate the **Mode** button on the top of each menu.

b Click the **Mode** button to choose presentation mode.

Click the left or right side of the **Mode** button to choose mode, or the middle of the button to open the parameter dialog.

Defining the function of the Mode buttons on the Operating Panel

The **Mode** buttons on your SH90 Operating Panel can either be used to select presentation mode, or user settings. You can switch between these options.

1 Click the **Display** tab to open the **Display** menu.

2 Click the **Mode Buttons:** button to select *Mode* or *User*.

Sorting the presentation modes

Your SH90 sonar provides you with a selection of presentation modes. This list of modes can be sorted to suit your preferences. The top four modes on your list can be chosen by pressing the four **Mode** buttons on the Operating Panel.

1 Click the **Setup** tab to open the **Setup** menu.

2 Click the **Sort Modes** button to open the **Sort Modes** menu.

The **Sort Modes** menu lists all the available modes in their current order.

3 Click one of the presentation modes.

Observe that the **Move down** and/or **Move up** buttons at the bottom of the menu are activated.

4 Click the **Move down** or **Move up** button to move the chosen presentation mode down or up the list.

5 When the list has been arranged in the order you wish to keep, click **Apply**.

The current order is saved automatically.

6 Click **Close** to exit.

Markers and symbols procedures

This section explains how to add, investigate and delete symbols and markers on the SH90 sonar presentation.

Topics

- *Adding 'Target' and 'Circle' markers to the sonar presentation* on page 66
- *Adding an 'Own ship' symbol to the sonar presentation* on page 67
- *Adding a 'Gear' symbol to the sonar presentation* on page 67
- *Investigating marker and symbol information* on page 68
- *Deleting a marker or symbol from the sonar presentation* on page 69

Adding 'Target' and 'Circle' markers to the sonar presentation

1 Move the cursor on the sonar picture, and position it wherever you wish to place the marker.

2 Press the requested marker button in the **Symbol** field on the Operating Panel to place the marker.

About Target markers

This button places a **Target marker** at the cursor location.

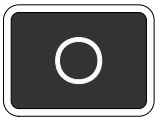
A triangular symbol with a corresponding number will appear on the screen over the target, while position data for the defined marker is displayed in the **Objects** menu.

- The system continues to track the markers even when outside the sonar range.
- The **Target marker** button can also be used for manual target tracking as the system is designed to calculate the speed, course and distance between the last two chosen targets.
- These target marker data are displayed in white figures for 15 minutes in the lower right hand corner of the horizontal presentation.
- This function is also an effective method for determining the distance between two selected points on the screen.

About Circle markers

This button places a **Circle marker** at the cursor location.

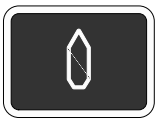
A circular symbol will appear on the screen at the chosen location. The size of the symbol is equal to that of the purse seine selected. This marker may be used to estimate the size of a school of fish or as an indication of the size of the purse seine.



Adding an 'Own ship' symbol to the sonar presentation

1 Press the **Own ship** button in the **Symbol** field on the Operating Panel.

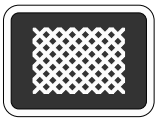
The square **Own ship symbol** is placed on the screen at the vessel's current location.



Adding a 'Gear' symbol to the sonar presentation

1 Press the **Gear** button in the **Symbol** field on the Operating Panel.

The gear symbol will either be a purse seine circle or a trawl symbol depending on the parameter chosen by the **Gear** button in the **Setup** menu. The selected gear symbol will be displayed in yellow.



How to use the seine circle

1 Press the **Gear** button on the Operating Panel.

The purse seine circle will appear on the forward end of the ship symbol on the corresponding side of the vessel selected in the **Setup** menu. The circle will follow the vessel's movements.

2 At the moment the seine is shot, press the **Gear** button again.

The purse seine circle will remain stationary and indicate the ideal path for setting the seine. Three square symbols on the ship's course line indicate the: shooting, one half, and the end of the seine positions. Three different nets can be defined if you click **Gear** on the **Setup** menu.

3 Press the **Gear** button to delete the purse seine circle.

How to use the trawl symbol

This is a useful aid in providing an overview of the trawl operation. Trawl data can be set manually using the menu or automatically by interfacing a Simrad FS trawl sonar or Simrad ITI trawl monitoring system with the sonar.

In the manual mode the trawl symbol will be displayed with the selected size, depth and distance. When the FS70, FS900 or FS3000 trawl sonar is connected, the trawl symbol will automatically be displayed with the correct depth in the vertical modes. When the ITI trawl system is connected, the trawl symbol will be displayed with the correct distance, bearing and depth. If required, the trawl opening, ambient water temperature, and trawl-filling indicator may also be displayed. This is assumed that the proper sensors are connected to the ITI system.

How to define and change the gear properties

The gear properties are changed by means of the **Gear** button on the **Setup** menu.

1 Click the middle of the **Gear** button to open the parameter dialog.
2 Click once on the gear you wish to use.
3 Click the **Edit** button at the bottom of the **Gear** parameter dialog.
4 For each of the gear parameters available, select the requested value.
5 Click **Close** when all the parameters have been defined.

Investigating marker and symbol information

1 Click the **Objects** tab to open the menu.
2 Observe that all the current objects (markers and symbols) are listed.
   - The **Objects** menu is shown in all presentation modes, and displays the range (R), bearing (B) and depth (D) to all selected objects.
   - The identification (ID) abbreviations for the different objects are:
     – AT: Automatic target track marker
     – Ci: Circle marker
     – M: Target marker
     – OS: Own Ship marker
     – PT: Position track marker
     – F: Radio buoy marker
   - The number behind the ID abbreviation refers to the same number on the object in the sonar presentation. The “P” after the Automatic target track marker indicates the priority level where the audio channel is locked to the target.
   - When you select a **Target marker**, **Automatic target track marker**or a **Radio buoy marker** in the list, a dotted bearing line from the vessel to the marker will be shown.

3 To retrieve the information about an object, click the object abbreviation in the list.

4 Observe that a dedicated parameter dialog with all known object information appears at the bottom of the menu.

Deleting a marker or symbol from the sonar presentation

1 Click the **Objects** tab to open the menu.

2 Click on the object that you wish to delete.

3 Click the **Delete** button at the bottom of the list.

Alternative method

1 Place the cursor on the object.

2 Press the **Object** button on the Operating Panel (or the right mouse button)

3 Click **Delete** on the menu.

Storage procedures

This section explains how to store and recall sonar images on the SH90.

Topics

- *Storing sonar images on the computer hard disk* on page 69
- *Recalling sonar images to view them* on page 70
- *Keeping sonar images from being deleted when the sonar is switched off* on page 71
- *Deleting sonar images that are no longer required* on page 72
- *Renaming the sonar images that you wish to keep* on page 72
- *Printing sonar images* on page 72
- *Burning sonar images on a blank CD or DVD* on page 73
- *Copying sonar images to a USB memory device* on page 73

Storing sonar images on the computer hard disk

Note that the **Record** button on the Operating Panel can be pressed at any time to start recording. It is not necessary to open the **Store/Recall** menu first. When this button is used, the currently selected recording mode will be used.

Prepare the recording parameters

1 Click the **Setup** tab to open the menu.

2 Click the **Store/Recall** button to open the **Store/Recall** menu.

3 Click the **Store mode** button to choose recording mode.

Click the left side of the **Store mode** button to scroll down the list of options. Click the middle of the button to open the parameter dialogue for direct access to the requested setting, or click the right side of the button to scroll up the list of options.

4 Record the images.

5 Click the **Close** button to close the **Store/Recall** menu.

Once the recording has been activated, the sonar will save sonar images as defined by the **Store mode** setting. Each image is added to the list of temporary files located below the buttons. Each file name reflects the date and time.

Record a single image

1 To record a single image:

A Click the **Store** button.

or

B Press the **Record** button on the Operating Panel.

2 Observe that the message field below the menu displays the image file name on a green background.

Record multiple images

1 To start recording:

A Click the **Store** button.

or

B Press the **Record** button on the Operating Panel.

2 Observe that the message field below the menu displays the image file names on a green background.

3 To stop recording:

A Click the **Store** button.

or

B Press the **Record** button on the Operating Panel.

Recalling sonar images to view them

Observe the following procedure to recall sonar images.

Preparations

1 Click the **Setup** tab to open the menu.

2 Click the **Store/Recall** button to open the **Store/Recall** menu.

3 Observe the list of images in the **Store/Recall** menu.

To recall a single image

1 Click the **Recall mode** button, and select **Single shot**.

2 Click one of the images to select it.

3 Click the **Recall** button to view the image.

The chosen image will be displayed. The phrase "RECALL" is used to indicate that a recalled image has replaced the sonar image.

4 Click the **Object** button on the Operating Panel to restore normal operation.

To recall several images

1 Click the **Recall mode** button, and select how long time you wish to see each image.

2 To select a number of images files, click the top file, then hold the **Select** button on the Operating Panel depressed while you move the cursor down to select the other files in the field.

3 Click the **Recall** button to view the images.

- The chosen images will be displayed, one by one. The phrase "RECALL" is used to indicate that a recalled image has replaced the sonar image.
- When all images has been displayed, the sonar will automatically resume normal operation.

Keeping sonar images from being deleted when the sonar is switched off

When you store new sonar images, they will by default be added to the list of **Temporary files**. This list will contain maximum 100 images, and when this limit has been reached, the oldest files will be automatically removed.

1 Click the **Setup** tab to open the menu.

2 Click the **Store/Recall** button to open the **Store/Recall** menu.

3 Observe the list of images in the **Store/Recall** menu. There are two lists, one for temporary files, and one for permanent.

4 Click one of the images in the **Temporary files** field to select it.

5 Click the arrow on the top of the **Permanent files** field to move the selected image down.

The **Permanent files** list does not limit the number of files it can contain. This is however limited by the storage capacity of the hard disk in the Processor Unit.

Deleting sonar images that are no longer required

1 Click the **Setup** tab to open the menu.
2 Click the **Store/Recall** button to open the **Store/Recall** menu.
3 Observe the list of images in the **Store/Recall** menu.
4 Click one of the images to select it.
5 Click the **Delete** button at the bottom of the file fields to delete the selected image.

Renaming the sonar images that you wish to keep

1 Click the **Setup** tab to open the menu.
2 Click the **Store/Recall** button to open the **Store/Recall** menu.
3 Observe the list of images in the **Store/Recall** menu.
4 Click one of the images in the **Permanent files** field to select it.
5 Click the **Rename** button below the files to rename the selected image.
   - Observe that a parameter dialogue opens to present the current file name.
   - Observe that an on-screen keyboard opens to allow you to enter characters.
6 Place the cursor at the beginning of the current file name, and click the **Del** (Delete) button on the on-line keyboard to remove the characters in the current file name.
   - Make sure that you do not delete the file name extension **.bmp**.
7 Click the necessary characters on the on-line keyboard to build a new file name.
8 Click the **Close** button in the parameter dialogue when you have completed the new file name.

Figure 1 On-screen keyboard

On-Screen Keyboard
File Keyboard Settings Help
esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 psc slk brk
| 1 2 3 4 5 6 7 8 9 0 + \ bksp ins hm pup nlk / * -
tab q w e r t y u i o p å ¨ ' del end pdn 7 8 9 +
lock a s d f g h j k l ø æ ent 4 5 6
shft z x c v b n m , . - shft 1 2 3 ent
ctrl alt alt ctrl 0 .

You are also permitted to change the file name on images in the **Temporary files** field. However, if you wish to transfer the chosen image to the **Permanent files** field afterwards, you will find that the new file name is changed by the transfer process.

Printing sonar images

1 Click the **Setup** tab to open the menu.
2 Click the **Store/Recall** button to open the **Store/Recall** menu.

3 Observe the list of images in the **Store/Recall** menu.

4 Click one of the images to select it.

5 Click the **Print** button below the files to print the selected image.

The image will be sent to the default printer connected to the Processor Unit. You are not allowed to control the output size and format.

Burning sonar images on a blank CD or DVD

The SH90 Processor Unit is provided with a CD player capable of burning blank CDs. Observe the following procedure to burn selected sonar images on a blank CD. Do not attempt this while the sonar is in use searching for fish!

Note

This procedure assumes that you have basic knowledge of file management in Windows.

To access the operating system functions, you can click any **Help** button. When the help window opens, you can also access the **Taskbar** with the **Start** button.

1 Insert a blank recordable CD in the Processor Unit.

2 Observe that the operating system's auto-start function opens a dialogue requesting guidance.

3 Select **Open writable CD folder using Windows Explorer**, and click **OK**.

4 Observe that a **Windows Explorer** window opens.

5 By means of normal Windows functions, navigate to the folder *d:/winson/screendumps*.

6 Double-click to open sub-folder *Permanent* or *Temporary*.

7 Click to select the images you wish to burn on the CD, and copy them to the CD's **Windows Explorer** window.

8 Click **Write these files to CD** in the **Windows Explorer** window, and wait until the process has finished.

9 Remove the CD, and close the **Windows Explorer** window.

Copying sonar images to a USB memory device

The SH90 Processor Unit is provided with several USB interface ports. These are located on the rear side of the cabinet, and on some models below the CD player under the front cover. Observe the following procedure to copy selected sonar images over to a USB memory stick. Do not attempt this while the sonar is in use searching for fish!

Note

This procedure assumes that you have basic knowledge of file management in Windows.

1 Insert a USB memory stick into the Processor Unit.

2 Observe that the operating system's auto-start function opens a dialogue requesting guidance.

3 Select **Open Windows Explorer**, and click **OK**.

4 Observe that a **Windows Explorer** window opens.

5 By means of normal Windows functions, navigate to the folder *d:/winson/screendumps*.

6 Double-click to open sub-folder *Permanent* or *Temporary*.

7 Click to select the images you wish to copy to the USB memory stick, and copy them to the USB's **Windows Explorer** window.

8 Remove the USB memory stick, and close the **Windows Explorer** window.

To access the operating system functions, you can click any **Help** button. When the help window opens, you can also access the **Taskbar** with the **Start** button.

Automatic search and tracking procedures

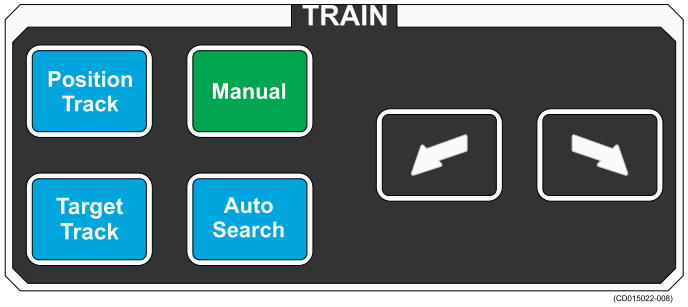
The SH90 sonar provides you with two automatic search programs, horizontal and vertical. Both are initiated from the Operating Unit

Topics

- *Starting the horizontal search program* on page 74
- *Starting the vertical search program* on page 75
- *Enabling position track* on page 75
- *Enabling target track* on page 76
- *Adding a target tracking line* on page 76

Starting the horizontal search program

Observe the following procedure to run the automatic search program.



Procedure

1 Press the **Auto search** button in the **Train** field on the Operating Panel to start the horizontal search program.

2 Hold the **Auto search** button depressed while you also press one of the two **"arrow"** buttons in the **Train** field.

3 Observe that the opening angle of the search sector is adjusted accordingly.

4 Release the **Auto search** button, press and hold one of the two **"arrow"** buttons.

5 Observe that the centre of the search sector is trained accordingly.

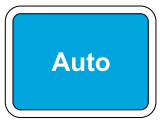
To exit the search program, press the **Manual** button.

Starting the vertical search program

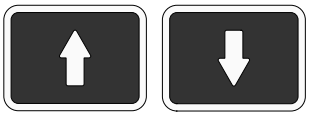
Observe the following procedure to run the automatic search program.

Procedure

1 Press the **Auto** button in the **Tilt** field on the Operating Panel to start the vertical search program.



2 Hold the **Auto** button depressed while you also press one of the two **"arrow"** buttons in the **Tilt** field.

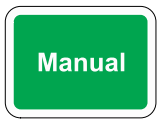


3 Observe that the vertical opening angle of the search sector is adjusted accordingly.

4 Release the **Auto** button, press and hold one of the two **"arrow"** buttons.

5 Observe that the centre of the vertical search sector is adjusted accordingly.

6 To exit the search program, press the **Manual** button.



Enabling position track

Observe this procedure to initiate a position track.

1 Place the cursor over the desired location.

2 Press the **Position track** button in the **Train** field on the Operating Panel.

A geographically fixed circle will appear on the display, and its position will automatically be tracked by the system with respect to the bearing and tilt angle. The track parameters can be investigated by accessing the **Objects** menu. When the *Auto Tilt* function is activated in the *Position Track* mode the tilt search centre is automatically adjusted with regard to the distance to the tracked position.

Enabling target track

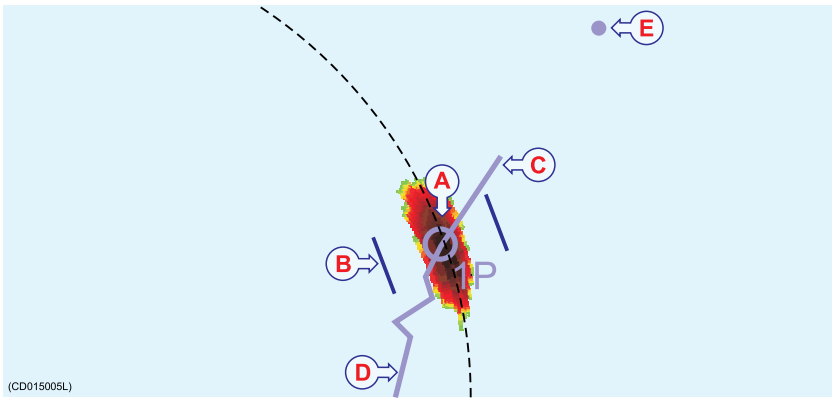
Observe this procedure to initiate a target track.

1 Place the cursor over the desired target.

2 Press the **Target track** button in the **Train** field on the Operating Panel.

A circle with dedicated identification (A) will appear on the display and its position will automatically be tracked by the system using the strongest echo centred in the track window (B) represented by the two bars on the audio line. The size of the track window may be selected using the **Track Window** button in the **Setup** menu.

Figure 2 Target tracking with related symbols



The vector (C) originating from the target's centre indicates its course and speed. The length of the vector increases relative to the target's speed. One knot is represented by a small mark on the vector. A course line (D) can also be displayed showing the target's track. A point ahead of the target indicates you position after a given time, and this time can be set using the **Movements** button on the **Setup** menu. Target tracking symbols and data are displayed with a light violet colour.

Adding a target tracking line

Observe this procedure to add a tracking line to a tracked target to indicate its movement history.

Procedure

1 Choose an presentation mode with a horizontal presentation.

2 Place the cursor in the horizontal presentation.

3 Press the **View** button in the **Cursor** field on the Operating Panel.

4 Observe that a short-cut menu appears on the display.

5 Click **View Menu**, and observe that the **GeoView** menu opens.

6 Click the **Target track** button on the **GeoView** menu.

7 Observe that the **Target track** parameter dialog opens below the menu.

8 Choose the length of the tracking line, and click **Close** to exit.

User setting procedures

This section explains how to handle user and default settings on the SH90 sonar.

Topics

- *Saving the current user setting* on page 77
- *Loading a previously stored user setting* on page 78
- *Renaming a user setting* on page 78
- *Deleting a user setting* on page 78
- *Loading the factory settings* on page 79

Saving the current user setting

Purpose

All the parameter settings you make can be saved for later use.

Procedure

1 Click the **Setup** tab to open the menu.

2 On the **Setup** menu, click **User setting** button to open the parameter dialog.

This function allows you to save the current user settings (including parameter selections), and to retrieve previously saved factory or user settings.

3 Click the **Save current setting** button.

The current setting is saved with the default identification name.

Loading a previously stored user setting

1 Click the **Setup** tab to open the menu.

2 Click the **User setting** button to open the parameter dialog.

3 Click the desired user setting to select it.

4 Click the **Load** button.

5 Click **OK** in the next parameter dialog to confirm the selection.

The selected setting is loaded.

Renaming a user setting

Note

*In principles you can use any name, but the **Mode** buttons on the Operator Panel will only choose from User 1, User 2, User 3 and User 4. These names must also be on the top of the list. If you wish to add users, apply names like for example "User 5 Charlie".*

1 Click the **Setup** tab to open the menu.

2 Click the **User setting** button to open the parameter dialog.

3 Click the one of the user settings on the list to select it.

4 Click the **Rename** button.

- Observe that a parameter dialog opens to present the current name.
- Observe that an on-line keyboard opens to allow you to enter characters.

5 Place the cursor at the beginning of the current name, and click the **Del** (Delete) button on the on-line keyboard to remove the characters.

6 Click the necessary characters on the on-line keyboard to build a new name.

7 Click the **OK** button in the parameter dialog when you have completed the new name.

8 Click the **Close** button in the **User Setting** parameter dialog when you have completed the procedure.

The new name is saved automatically.

Deleting a user setting

1 Click the **Setup** tab to open the menu.

2 Click the **User setting** button to open the parameter dialog.

3 Click the desired user setting to select it.

4 Click the **Delete** button.

5 Click **OK** in the next parameter dialog to confirm the selection.

The selected user setting is deleted.

Loading the factory settings

1 Click the **Setup** tab to open the **Setup** menu.

2 Click the **Default setting** button.

3 Click **OK** in the next parameter dialog to confirm the action.

The factory settings are loaded and implemented.

Installation of optional functionality

Optional functionality may be added to the SH90.

All options are pre-programmed into the standard sonar version. When ordering a permanent option installation, a code word will be released from Simrad. For installation of options, observe the following procedures.

Topics

- *Opening the 'Install Options' parameter dialog* on page 80
- *About the 'Install Options' parameter dialog* on page 80
- *Adding optional functionality* on page 81

Opening the 'Install Options' parameter dialog

This procedure explains how to locate and open the **Install Options** parameter dialog.

1 Select the **Setup** menu.

2 Click the **Test** button to open the **System test** menu.

3 Click the **Installation Menu** button.

4 Observe that the installation menu bar is shown on the top of the screen.

5 Click **Options →Install options**.

6 Observe that the **Install Options** parameter dialog opens.

About the 'Install Options' parameter dialog

The **Install Options** parameter dialog can be opened from the **Installation Menu**. The **Installation Menu** is in turn opened from the **System test** menu.

The **Install Options** parameter dialog allows you to look up the unique hardware ID that identifies the sonar. You are also permitted to enter a dedicated code to unlock optional functionality.

Each sonar is identified by a unique hardware ID (HWID). If you return this number to your dealer, he can provide you with the code necessary to activate the optional functionality. A dedicated procedure is provided.

→ *Opening the 'Install Options' parameter dialog* on page 80

→ *Adding optional functionality* on page 81

Parameters

1 HWID

This field displays the unique 12-character hardware identification code. This code is different for each SH90 sonar. Simrad uses this code to generate the 32-character code word used for a permanent option installation.

2 Add License String

This button is used for permanent installation of the chosen option. When you click the button, this will activate the on-screen keyboard used to type the required 32-character code word.

3 Close

Click to close the parameter dialog. The currently selected parameter setting will be kept.

Adding optional functionality

This procedure explains how to add optional functionality permanently to the sonar.

1. Obtain the option code as follows:
   - **a** Open the **Install Options** parameter dialog, and write down the **HWID** number.
   - **b** Send the **HWID** number to your dealer. Makes sure that you write down the character string correctly!
   - **c** Use the sonar without the option until your dealer approaches you with a code word.
2. Open the **Install Options** parameter dialog, and click the **Add License String** number.
3. Place the cursor in the text field.
4. Type the code word on the on-screen keyboard.
5. Check that the 32 characters are entered correctly into the text field.
6. Click the **Apply License String** button.
7. Close the parameter dialog.
8. Restart the sonar
9. Check that the option is available for use.

Presentation modes

The SH90 sonar provides you with several different presentation modes. These have been created to cover all your operational needs for various types of fishing and fishing gear.

Bow up

When *Bow up* mode is selected, the vessel symbol is stationary on the screen with the bow pointing upwards.

The echo presentation covers 360 degrees around the vessel, and all echoes are updated for every ping. The distance from the vessel symbol to the outer echo ring is equal to the selected range. The movement of the echoes across the presentation is controlled by a combination of the vessel's course and speed, and the target's own movements.

Bow up/Audio

When *Bow up/Audio* mode is selected, the upper half of the screen shows a bow-up presentation, while the lower part is used for a recording of the audio channel.

The audio channel is shown with a continuous white line in the horizontal picture, and it can be trained in any direction. The recorded echoes are a direct replica of the echoes under the white audio line.

As the audio channel is recorded over a period of time, this mode is especially useful for detection of weak echoes mixed with reverberation or noise. The information recorded by the audio channel is always stored in the computer, even if another mode is selected. That means that this recording will always be presented when selecting the *Bow up/Audio* mode.

Note that the vessel symbol can be moved to any position in the horizontal view with the cursor and the **Off Centre** button on the Operating Panel.

Bow up/Vertical

When *Bow up/Vertical* mode is selected, the picture is divided into three sections.

The left side is a bow-up presentation similar to the *Bow up* mode previously described. The upper part on the right hand side is a *Catch data* presentation, while the lower part is a *Vertical slice* presentation.

Bow up/Dual Vertical

When *Bow up/Dual vertical* mode is selected, the upper part of the screen shows a curtailed bow-up presentation, while the lower part shows two vertical slice presentations.

The bearing of the left vertical presentation is indicated by the white audio line in the horizontal presentation, while the bearing of the right vertical presentation is indicated by the yellow-dashed line. All borders between the different views may be moved to any position by means the trackball.

Bow up/180° Vertical

When the *Bow up/180° Vertical* mode is selected, the upper part of the screen shows a curtailed *Bow up* presentation, while the lower part shows a 180 degrees *Vertical slice* presentation.

This mode is mainly intended for trawlers, where the vertical view acts as a multibeam echo sounder. The bearing of the vertical slice can be selected in the **Vertical View** menu. You can control the audio line, an indicator line, or you can set it to be locked in forward, aft or athwart ships position. As the cylindrical transducer has a “blind zone” straight down, an echo presentation in this direction will be limited to two approximately 60 degrees sectors. To avoid this “blind zone”, the vertical slice is made “tippable”, and by selecting a -60 degrees tip angle (or less), a full 180 degrees coverage is obtained. The tip angle can be adjusted from +10 to -90 degrees. In addition to the read-out in the **Tip** menu button, the selected tip angle is shown with a dotted yellow line in the tilt indicator in the upper left corner.

True motion

When *True motion* mode is selected, the picture is locked to a geographical position, where the vessel moves around the screen according to its present course and speed.

All echoes are always presented in their correct position relative to the vessel, and their movements on the screen will be a true representation of the movements of the targets through the water. When the vessel symbol reaches the edge of the screen, it will automatically be moved back to the centre, or to a position determined by the **Off Centre** button on the Operating Panel. This position is reset to the screen centre whenever the mode is changed.

When you press the **Target Track** button on the Operating Panel, the target will automatically be moved to the screen centre.

True motion/Vertical

When *True motion/Vertical* mode is selected, the picture is divided into three sections.

The left side is a *True motion* presentation similar to the true motion mode previously described. The upper part on the right hand side is a *Catch data* presentation, while the lower part is a *Vertical slice* presentation.

North up

When *North up* mode is selected, true north is always up on the screen.

The vessel symbol is stationary with the bow pointing in the vessel's course direction. The movement of the echoes across the screen are controlled by a combination of the vessel's course and speed and the target's own movements.

Dual 1

The *Dual 1* mode is a kind of "two sonars in one" operation, where each presentation is updated for every second transmission.

All settings can be set individually for each of the two presentations. This makes the dual mode especially useful for optimizing settings by directly comparing the two presentations. To optimize the horizontal settings, use the **Horizontal** menu to try different settings in the upper picture. These settings are automatically transferred to the other modes. The dual operation may also be used for other user applications, where different range, tilt, frequency and other parameters can be selected.

Dual 2

The *Dual 2* mode is very similar to the *Dual 1* mode previously described, but the "two sonars" are presented next to each other.

All settings can still be set individually for each of the two presentations.

270°/Vertical

The *270°/Vertical* mode is specially designed for purse seining. The vertical half slice is displayed in the lower left corner for normal setting with the net on the starboard side.

If the net is set on the port side, the 60 degrees vertical slice will be displayed in the lower right hand corner. With this presentation, it is easy to keep the best contact with a school in both the vertical and horizontal presentation, and to determine its size distribution. The position of the school relative to the bottom is another important information provided by this presentation. The *Catch data* presentation for purse seining is shown on the right hand side. It shows all the net data relative to the target and the bottom, as well as all available target data.

Operating Panel

The frequently used functions are directly accessible by the designated control buttons on the Operating Panel, and may enter operational commands directly. The buttons are grouped in fields according to their purpose. Most sonar functions are also accessible and activated using the menu system on the display and the trackball and **Select** button on the Operating Panel.

Figure 3 Operating Panel

Main Switch

This is the sonar's “on/off” switch. It has been previously explained.

→ *Power on/off procedures* on page 22

Symbol

Circle marker and **Gear symbol**. The two markers will be placed at the cursor's location when you press the button. The **Own ship symbol** produces a square symbol on the screen at the vessel’s current location when the button is pressed, while the **Gear symbol** is used to deploy a seine or trawl symbol.

→ *Markers and symbols procedures* on page 66

Mode

These four buttons provide fast access to the four presentation modes you select, or to four predefined user configurations. You must select which four modes or user configurations to select, and in which order they shall appear. To choose button function, click **Mode** button on the **Display** menu. To define the order of the presentation modes, click **Sort modes** on the **Setup** menu.

→ *Mode procedures* on page 65

→ *User setting procedures* on page 77

Gain

This is where you set up the gain in both horizontal and vertical presentations.

→ *Adjusting the vertical and horizontal gain* on page 60

Range

This is where you select the range in the horizontal and vertical presentations.

Cursor

The trackball is used to move the cursor on the display. The **Menu** button is used to hide the menu, while the **Select** button is used to make selections on the display. The **View** and **Object** buttons open specific short-cut menus.

→ *Controlling the cursor* on page 25

Tilt

These are the buttons used to tilt the sonar beam up or down. You can also start an automatic tilt program to carry out automatic searches.

→ *Starting the vertical search program* on page 75

Train

These buttons control the sideways movements (training) of the sonar beam. You can also start an automatic training program to carry out automatic searches, and you can lock the beam on a chosen target or position.

→ *Starting the horizontal search program* on page 74

→ *Adding 'Target' and 'Circle' markers to the sonar presentation* on page 66

Various

These buttons are used to start a recording and to zoom in on the sonar picture.

→ *Storage procedures* on page 69

Menu system

The Simrad SH90 sonar is equipped with an extensive menu system, and you will use this to choose parameters for the various operational modes and functions.

The chapter gives you a short description of each menu choice.

This chapter does not describe all the menu buttons on the SH90. For a complete description of these, refer to the *SH90 Reference Manual*.

In order to select active menu and to click the various buttons, you must use the cursor. The cursor is controlled by the trackball on the Operating Panel, and to “click” you simply press the **Select** button.

Topics

- *Active menus* on page 87
- *Temporary menus* on page 99

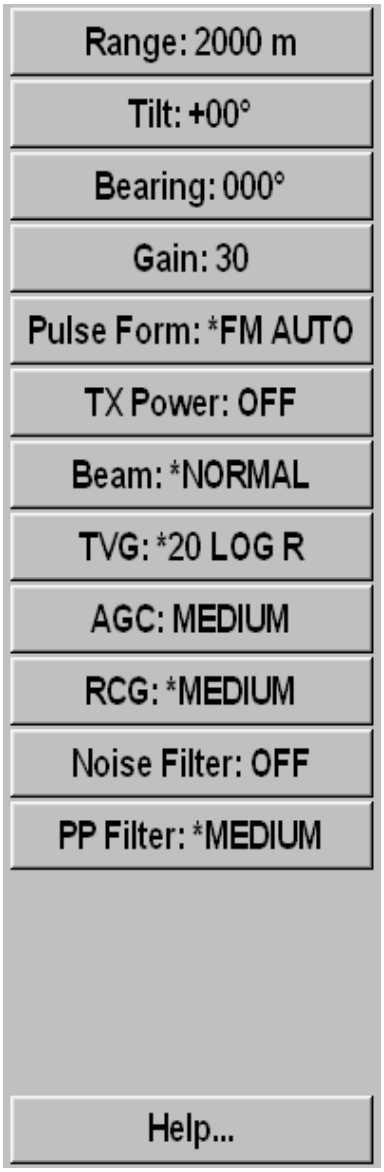
Active menus

The active menus are those relevant for the different presentation modes. The menus are shown with vertical selector tabs on the right hand side, and each menu can easily be selected using the trackball and the **Select** button on the Operating Panel. All menus have access to on-line help through a **Help** button.

Topics

- *Horizontal menu* on page 88
- *Vertical menu* on page 90
- *Vertical 180 menu* on page 92
- *Display menu* on page 94
- *Setup menu* on page 96
- *Objects menu* on page 98

Horizontal menu



The **Horizontal** menu is used to control the horizontal presentations. The parameters chosen are present in all presentation modes. When a horizontal parameter setting is selected and defined in one mode, the chosen settings will automatically be applied to all modes.

The **Horizontal 2** menu is identical to the **Horizontal** menu. It is used during *Dual 1* and *Dual 2* operations.

Parameters

1 Mode

The purpose of the **Mode** button is to choose the presentation mode.

2 Range

This parameter is used to control the range of the SH90, that is the distance from the vessel to the outmost edge of the sonar beam.

3 Tilt

This parameter allows you to manually control the angle of the sonar beam tilt.

4 Bearing

This parameter is – when opened from the **Horizontal** menu – used to control the bearing of the horizontal sonar beam.

5 Gain

This parameter is used to control the receiver gain, that is how much amplification that is used on the received echoes.

The chosen gain is only applied to the horizontal presentation.

If you activate the **AGC** (Automatic Gain Control) function, this gain setting is influenced.

6 Pulse Form

This parameter dialog is used to select the shape of the transmitter pulses.

These can either be CW (Continuous Wave) with different pulse lengths, or FM (Frequency Modulation) with different pulse lengths and a continuous frequency sweep.

7 TX Power

This parameter dialog is used to select the output power from the SH90 transmitters.

8 Beam

This parameter allows you to control the vertical beam width in the horizontal presentation.

9 Frequency

This parameter is used to control the transmitter and receiver operational frequency.

10 TVG

This parameter allows you to choose the Time Variable Gain setting in the SH90. This function will automatically adjust the gain in the SH90 to compensate for geometric spreading and absorption.

11 AGC

This parameter controls the Automatic Gain Control. This function will automatically reduce the gain if you experience reverberation and noise, or increase it if the conditions permit it.

12 RCG

This parameter is used to control the Reverberation Controlled Gain. This function will automatically remove unwanted reverberation from the bottom or from the sea surface. It may however also remove scattered fish from the presentation.

13 Noise Filter

This parameter allows you to control the built-in filter designed to remove unwanted acoustic noise from the SH90 presentation.

It will reduce the interference from other acoustic systems (sonars and echo sounders) on your own vessel and from other vessels in the vicinity. It will also suppress the noise from your own and other vessels' propellers, and from other similar noise sources.

14 PP Filter

This parameter controls the ping-ping filter, which reduces the amount of unwanted noise and echoes on the screen. The filter will only show you the echoes if they are still present after several consecutive pings (2, 4 or 8). This function will provide you with a more stable echo presentation, as spurious echoes will be suppressed.

15 Status

The **Status** parameter dialog contains a transducer position indicator, as well as presentation of current time, date, latitude, longitude, heading and speed. Some of the buttons allow you to adjust these parameters.

Vertical menu

The **Vertical** menu is only shown in modes with a vertical slice function. All relevant settings, except the **TX Power**, can be selected separately for the vertical modes independent of the horizontal settings. When any vertical setting is selected and defined in one mode, the setting will be applied to all vertical modes.

Parameters

1 Mode

The purpose of the **Mode** button is to choose the presentation mode.

2 Range

This parameter is used to control the range of the SH90, that is the distance from the vessel to the outmost edge of the sonar beam.

3 Bearing

This parameter controls – when opened from the **Vertical** menu – the bearing of the vertical slice, and thus the audio line.

4 Gain

This parameter is used to control the receiver gain, that is how much amplification that is used on the received echoes.

The chosen gain is only applied to the vertical presentation.

If you activate the **AGC** (Automatic Gain Control) function, this gain setting is influenced.

5 Pulse Form

This parameter dialog is used to select the shape of the transmitter pulses.

These can either be CW (Continuous Wave) with different pulse lengths, or FM (Frequency Modulation) with different pulse lengths and a continuous frequency sweep.

6 TX Power

This parameter dialog is used to select the output power from the SH90 transmitters.

7 Frequency

This parameter is used to control the transmitter and receiver operational frequency.

8 TVG

This parameter allows you to choose the Time Variable Gain setting in the SH90. This function will automatically adjust the gain in the SH90 to compensate for geometric spreading and absorption.

9 AGC

This parameter controls the Automatic Gain Control. This function will automatically reduce the gain if you experience reverberation and noise, or increase it if the conditions permit it.

10 RCG

This parameter is used to control the Reverberation Controlled Gain. This function will automatically remove unwanted reverberation from the bottom or from the sea surface. It may however also remove scattered fish from the presentation.

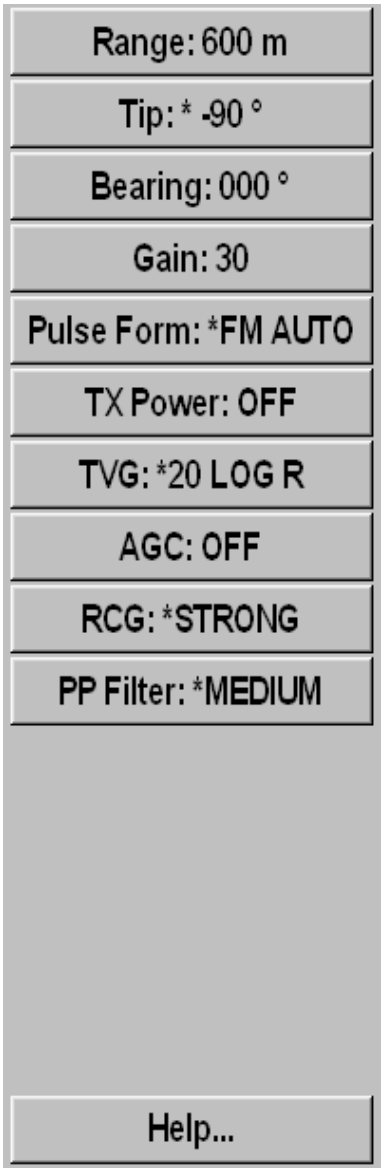
11 PP Filter

This parameter controls the ping-ping filter, which reduces the amount of unwanted noise and echoes on the screen. The filter will only show you the echoes if they are still present after several consecutive pings (2, 4 or 8). This function will provide you with a more stable echo presentation, as spurious echoes will be suppressed.

12 Status

The **Status** parameter dialog contains a transducer position indicator, as well as presentation of current time, date, latitude, longitude, heading and speed. Some of the buttons allow you to adjust these parameters.

Vertical 180 menu



The **Vertical 180** menu is only shown when the *Bow up/180° Vertical* mode is chosen. All relevant settings, except the **TX Power**, can be selected separately for the vertical modes independent of the horizontal settings. When any vertical setting is selected and defined in one mode, the setting will be applied to all vertical modes.

The **Tip** button is only available on this menu. The **Tip** button is used to tip the vertical slice to avoid the blind zone.

Parameters

1 Mode

The purpose of the **Mode** button is to choose the presentation mode.

2 Range

This parameter is used to control the range of the SH90, that is the distance from the vessel to the outmost edge of the sonar beam.

3 Tip

This parameter controls the angle of the vertical slice in the *Bow up/180° Vertical* mode. Use this feature to avoid the vertical blind zone.

4 Bearing

This parameter controls – when opened from the **Vertical** menu – the bearing of the vertical slice, and thus the audio line.

5 Gain

This parameter is used to control the receiver gain, that is how much amplification that is used on the received echoes.

The chosen gain is only applied to the vertical presentation.

If you activate the **AGC** (Automatic Gain Control) function, this gain setting is influenced.

6 Pulse Form

This parameter dialog is used to select the shape of the transmitter pulses.

These can either be CW (Continuous Wave) with different pulse lengths, or FM (Frequency Modulation) with different pulse lengths and a continuous frequency sweep.

7 TX Power

This parameter dialog is used to select the output power from the SH90 transmitters.

8 Frequency

This parameter is used to control the transmitter and receiver operational frequency.

9 TVG

This parameter allows you to choose the Time Variable Gain setting in the SH90. This function will automatically adjust the gain in the SH90 to compensate for geometric spreading and absorption.

10 AGC

This parameter controls the Automatic Gain Control. This function will automatically reduce the gain if you experience reverberation and noise, or increase it if the conditions permit it.

11 RCG

This parameter is used to control the Reverberation Controlled Gain. This function will automatically remove unwanted reverberation from the bottom or from the sea surface. It may however also remove scattered fish from the presentation.

12 PP Filter

This parameter controls the ping-ping filter, which reduces the amount of unwanted noise and echoes on the screen. The filter will only show you the echoes if they are still present after several consecutive pings (2, 4 or 8). This function will provide you with a more stable echo presentation, as spurious echoes will be suppressed.

13 Status

The **Status** parameter dialog contains a transducer position indicator, as well as presentation of current time, date, latitude, longitude, heading and speed. Some of the buttons allow you to adjust these parameters.

Display menu

The **Display** menu is shown in all presentation modes, and provides access to parameters controlling the visual presentation of the SH90 presentations.

Note that some of the choices on the menu are simple on/off buttons.

Parameters

1 Mode

The purpose of the **Mode** button is to choose the presentation mode.

2 Full Screen

This is an on/off switch. When switched "on" the menu system is removed from the SH90 presentation. To recall the menu, move the cursor to the left side of the screen, observe that the menu appears, then switch **Full Screen** "off".

The same function is provided by the **Menu** button on the Operating Panel.

3 Palette

This parameter allows you to choose a presentation colour palette to suit your personal preferences and the ambient light conditions.

4 Display Gain

This function controls the "amount" of echo that are displayed – the strength of the echo presentation on the display. Use this control together with **Gain** to control the SH90 sensitivity.

5 Colour Threshold

This function is provided to control how many colours you wish to use in the echo presentation.

The selected colour threshold is reflected in the colour bar in the **Display** menu.

6 Colours

This parameter allows you to control how bright colours you wish to use. The colour bar in the menu shows the colour range currently in use.

7 Resolution

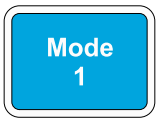
Select 16 or 64 colours in the display presentation. This is a personal preference. The chosen resolution is shown in the colour bar below the button.

8 Panel Backlight

This function controls the intensity of the button backlighting in the Operating Panel.

9 Mode buttons

Use this button to choose how the **Mode** buttons on the Operating Panel shall work. You can either choose between the four most frequent modes, or the four most frequent user settings.



10 Language

Use this function to choose the language used on the menu buttons.

11 Units

This parameter allows you to choose the measurement units used by the SH90.

12 Cosmetics

Click to access the **Cosmetics** menu, which allows you to control the amount of support information on the SH90 presentation.

13 Bearing

Set up the vertical slice – and thus the sound channel – bearing to be relative or related to true north.

14 Menu

This function allows you to choose if you wish to see the complete menus (as described here), or just the most important settings.

15 Status

The **Status** parameter dialog contains a transducer position indicator, as well as presentation of current time, date, latitude, longitude, heading and speed. Some of the buttons allow you to adjust these parameters.

Setup menu

The **Setup** menu is shown in all presentation modes, and gives access to parameters controlling the processing and algorithms in the SH90.

It also provides access to specific system parameters and functions such as **Test** and **Store/Recall**.

Parameters

1 Mode

The purpose of the **Mode** button is to choose the presentation mode.

2 Store/Recall

Click this button to record and playback SH90 images.

3 Test

Click this button to access the test software in the SH90. These utilities are only provided for certified service technicians, and they are not documented.

4 Gear

This function allows you to select the type of fishing gear you use. This will draw the gear in the right size and position relative to the own vessel symbol in the SH90 presentation.

5 School

This function allows you to obtain information of the volume estimation of a school. The information is used in the automatic target tracking program.

6 Dead Reckoning

This is an on/off function. When switched “off”, the GPS is used to calculate the position of your vessel. When “on”, the position is calculated based on the current speed and the input from the gyro.

7 Stabilizer

This is an “on/off” switch. When the stabilizer function is active, the SH90 will automatically adjust the presentation to compensate for the ship's movements in the sea.

8 Movements

This function makes it possible to estimate the position of a tracked school at a given future time.

9 Track window

This command enables you to adjust the size of the “window” the SH90 places on the chosen target. The SH90 will use the echoes detected within this “window” to control the tracking.

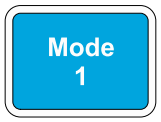
10 Wind direction

If you do not have a wind sensor connected to your SH90, you can use this parameter to set the wind direction manually.

11 Wind speed

This is not a parameter. It is only a presentation of the current wind speed provided that a wind sensor is connected to the SH90.

12 Sort Modes



Click this button to open the **Sort Modes** menu. This menu is used to select the presentation modes to be activated by the four **Mode** buttons on the Operating Panel. The four upper presentation modes in the **Sort Modes** menu will always be the four modes activated by the four **Mode** buttons in the order they are sorted.

13 External sync(hronisation)

This function makes it possible to eliminate interference from other Simrad sonars on board your vessel. If the sonars are connected together, you can use these settings to synchronise their transmissions.

14 Fish alarm

This function makes it possible to set up the SH90 to warn you when a school of fish are detected inside a selected search sector. The selected sector is shown with white dashed lines in the horizontal presentation.

15 User setting

This function allows you to save the current user settings (including parameter selections), and to retrieve previously saved factory or user settings.

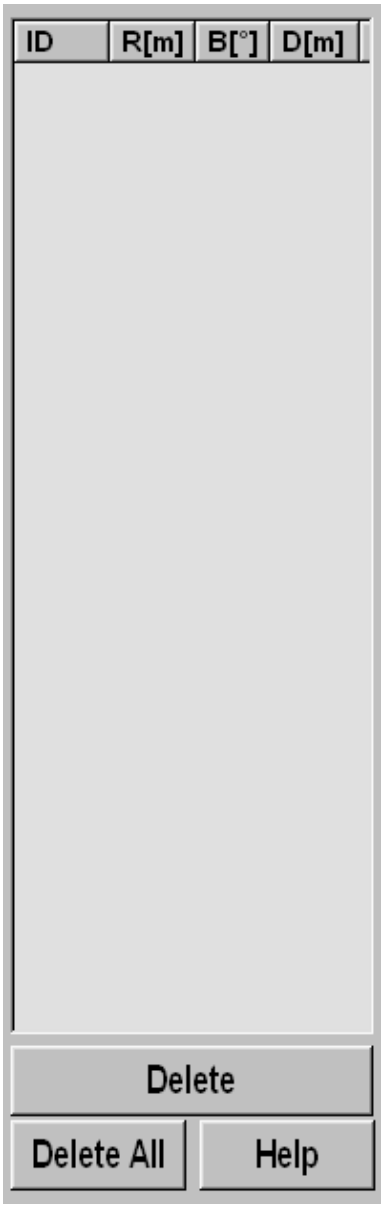
16 Default Setting

Click this button to retrieve the default factory settings.

17 Status

The **Status** parameter dialog contains a transducer position indicator, as well as presentation of current time, date, latitude, longitude, heading and speed. Some of the buttons allow you to adjust these parameters.

Objects menu



The **Objects** menu is shown in all presentation modes, and displays the Range (R), Bearing (B) and Depth (D) to all selected objects. The identifying abbreviations for the different objects are:

- **AT**: Automatic Target Track marker
- **Ci**: Circle marker
- **M**: Target marker
- **OS**: Own Ship marker
- **PT**: Position Track marker
- **F**: Radio Buoy marker (if a GPS buoy system is connected)

To delete an object, select the relevant marker in the list, and click the **Delete** button in the lower part of the menu.

Click the **Delete All** button to delete all objects.

To delete an object, select the relevant marker in the list, and click the **Delete** button in the lower part of the menu.

Click the **Delete All** button to delete all objects.

The number behind the identifying abbreviation refers to the same number on the object in the sonar presentation. The **P** after the **Automatic Target Track** marker indicates the priority level where the audio channel is locked to the target.

When selecting an object in the list, a list with all the available object data will be shown below the **Objects** menu. When selecting a **Target** marker, **Automatic Target Track** marker or a **Radio Buoy** marker in the list, a dotted bearing line from the vessel to the marker will be presented.

The parameters for each marker are shown in the **Inspect Object** parameter dialog. Click on a marker to investigate its parameters.

Parameters

1 Mode

The purpose of the **Mode** button is to choose the presentation mode.

2 Delete (object)

In the **Objects** menu, click to select an item from the list of current marker objects. Then, click this button to delete the selected object. On the sonar presentation, position the cursor on the object, open the **Object** pop-up, and click **Delete (object)**.

3 **DeleteAll (objects)**

Click once to delete all current objects from the **Objects** menu.

4 **Inspect Object**

The **Inspect Object** parameter dialog allows you to investigate the specific parameters for each selected object.

The parameter dialog opens automatically when you click on one of the object IDs.

5 **Status**

The **Status** parameter dialog contains a transducer position indicator, as well as presentation of current time, date, latitude, longitude, heading and speed. Some of the buttons allow you to adjust these parameters.

Temporary menus

The temporary menus are those selected from the active menus. They are also shown with vertical tabs on the right side of the menu, and can easily be selected by the trackball and the **Select** button. The temporary menus must however be removed manually using the **Close** button in the bottom of menu.

All temporary menus have access to on-line help through a **Help** button.

Topics

- *Cosmetics menu* on page 99
- *Store/Recall menu* on page 99
- *System Test menu* on page 99
- *Sort Modes menu* on page 100

Cosmetics menu

The **Cosmetics** menu is activated by pressing the **Cosmetics** button in the **Display** menu. The menu provides access to various parameters controlling the appearance of the sonar picture. All the functions - except **Track History** - are on/off buttons.

Store/Recall menu

The **Store/Recall** menu is activated by the **Store/Recall** button in the **Setup** menu. This menu is used to store single display pictures or a sequence or pictures. The stored pictures can easily be recalled for evaluation or comparing schools.

→ *Storage procedures* on page 69

→ *Setup menu* on page 96

System Test menu

The **System test** menu is activated by the **Test** button in the **Setup** menu.

This menu provides several sensor measurements and test functions for operational and functional tests. Note that tests are designed only to be carried out by qualified service engineers. From this menu you can also access the **Message Bar** configuration.

→ *Setup menu* on page 96

Sort Modes menu

This menu is used to select the presentation modes to be activated by the four **Mode** buttons on the Operating Panel.

The four upper presentation modes in this menu will always be the modes selected by the four **Mode** buttons in the order they are sorted. In order to sort the modes, click on a mode to select it, and click the **Move Up** and **Move Down** buttons to move the selected mode up or down the list. When the modes are organized in the requested order, click the **Apply** button to save the setting, and **Close** to close the menu.

→ *Mode procedures* on page 65

Sonar theory

This chapter explains some of the basic theory related to settings, error sources and noise conditions.

Topics

- *Parameters* on page 101
- *Noise and reverberation* on page 106
- *Layers and deflections* on page 109

Parameters

A sonar will transmit a sound wave into the water around the vessel. When this sound wave hits fish, bottom, or other objects in the water, a part of the sound will be returned as echoes. These echoes are collected by the sonar, interpreted by the sonar computers, and presented on the display.

The most important interpretation is however left to you, and it may often be difficult to distinguish the echoes and identify the targets. In order to help you with this, the SH90 sonar provides numerous advanced filter and gain functions. You can also tilt the sonar beam vertically in order to achieve an optimum result, and you can use the vertical slice to view “across” the water column.

This section provides you with some basic theory about some of the key parameters that are available.

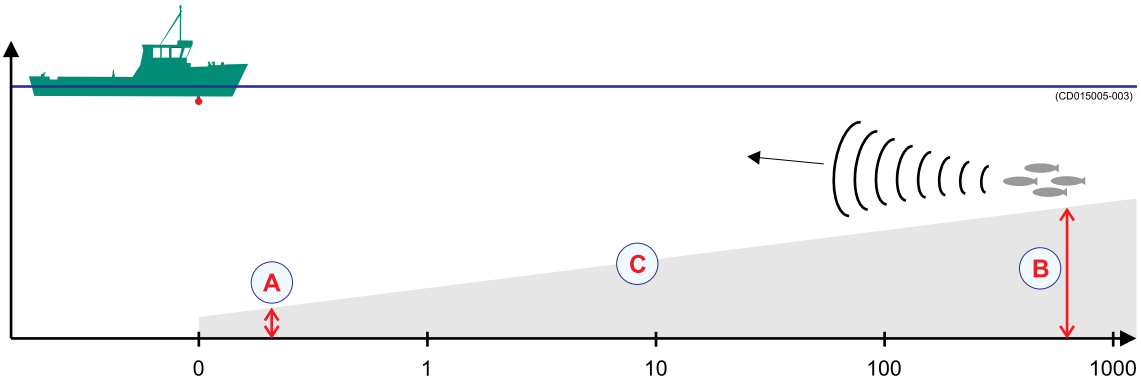
Topics

- *What is TVG?* on page 102
- *What is AGC?* on page 102
- *What is the PP Filter?* on page 103
- *About pulse form and length* on page 103
- *About beam widths* on page 104
- *About Gain* on page 104
- *What is RCG?* on page 105
- *About tilt* on page 105

What is TVG?

TVG means *Time Varied Gain*. As echoes will be weaker when the distance to them increase, the sonar will automatically amplify distant echoes more than close echoes. In practice, the gain will increase in proportion with how long the sonar must wait for the echoes.

Figure 4 The TVG principle: The gain at time (B) is larger than at time (A)



When you choose the TVG setting you can either switch it off, or choose a **"X log R"** value. The different settings determine how much gain the sonar will use as time elapses along the X-axis. A higher value for "X" will make the angle (C) steeper.

Tip

For scattered fish, we suggest that you use the **40 log R** setting. For small schools, try **30 log R**, for large schools, use **20 log R**. If you use **20 log R** the bottom will always be presented with the same echo strength.

If you wish to examine weak echoes very close to your vessel, you may wish to use **10 log R** or **5 log R**, or turn off the TVG.

Keep in mind that the filters in the SH90 are implemented in "series". The TVG compensations are made before the AGC (Automatic Gain Control). For this reason, your TVG setting will always have an effect on the AGC.

If you disable the TVG compensation, maximum gain will be used on all ranges.

What is AGC?

AGC means *Automatic Gain Control*. The AGC will automatically scale the received echo data to maintain a proper dynamic range based on all the incoming echo values. In addition to *Off*, the strength of the filter can be set to three different levels.

The AGC (Automatic Gain Control) function adjusts the gain using an image processing algorithm. This processing depends on the strength of the incoming echo signal. The image is analyzed, and reverberation and echoes are identified. Based on the analysis, weak echoes are amplified, while strong echoes are reduced. The result is a "normalizing" effect that reduces noise and reverberation. The AGC is functional up to

the sonar's maximum range. As show in the menu, the AGC has four different settings. These settings define the difference between the maximum and minimum echo level for the filter to take effect.

Tip

The most practical way to use the AGC (Automatic Gain Control) is to first switch it off. Adjust the echo presentation using the gain until you have the best possible result, then activate the AGC.

The AGC works best with even background (homogenous noise conditions) and pronounced targets. With uniform sonar conditions you may benefit from strong AGC compensation. However, if you are looking at scattered fish, reduce the AGC, and try to add gain instead.

If you work close to other vessels, the noise from their propellers may be misinterpreted as echoes. This will also reduce the visibility of other echoes. Reduce the AGC. The same applies if the bottom conditions place your vessel with decreasing depth on one side of the vessel and your targets on the other side.

If you have very strong echoes from a large school located close to your vessel (typically closer than 150 meters), we recommend that you reduce or switch off the AGC. This is because the AGC filter misinterprets the school for noise.

Keep in mind that the filters in the SH90 are implemented in "series". The gain compensations are made before the AGC. For this reason, your gain setting will always have an effect on the AGC.

What is the PP Filter?

PP Filter means *Ping-to-Ping filter*. When this function is activated, the sonar will compare the echoes from one ping with the echoes from the next pings. If an echo is present at the first ping, but then disappears at the next, the sonar will interpret this as noise and reverberation, and suppress it.

If you choose setting **Weak**, the sonar will only compare two consecutive pings. If you choose settings **Medium** or **Strong** the sonar will compare four and eight pings respectively.

About pulse form and length

On the SH90 sonar, you can transmit sound modulated as

- FM
- CW

FM means *frequency modulated*, which means that the frequency of the transmitted pulse is changed during the transmission. In most cases this method will provide better echo presentation and stability, and you will avoid excessive noise and reverberation.

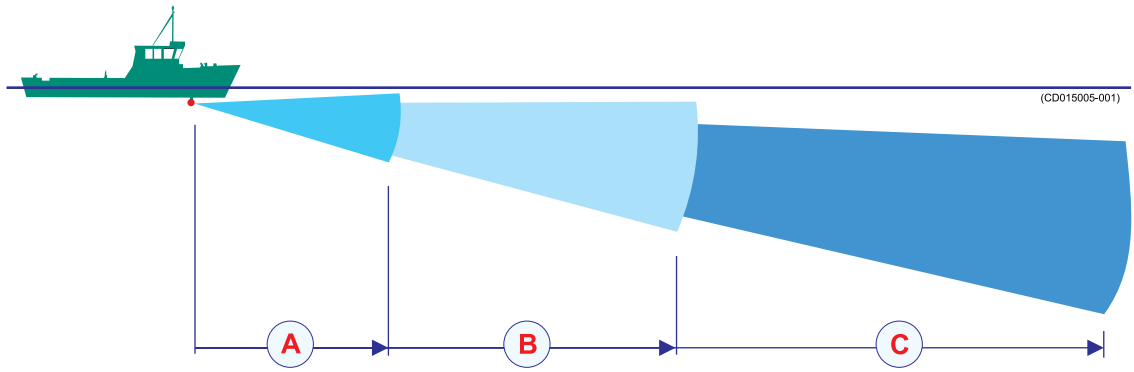
CW means *continuous wave*, which means that the transmission frequency is fixed during the entire pulse. When you use CW transmission you can choose the length of the pulses. In a search phase under good conditions, you should try setting **Long**. If the conditions worsen, try to shorten the pulse length. This will make it easier to distinguish the various echoes, and the reverberation will be reduced.

The default setting on the SH90 sonar is **FM Auto**. In this transmission mode, the sonar will automatically choose the optimal pulse length for the current range.

About beam widths

A narrow beam will always reach further than a wide beam. This is because the transmitted power of the sonar is concentrated. Nevertheless, you can easily "miss" a school of fish if you make the beam too narrow. If the range is reduced, it is the common to use a wider beam.

Figure 5 Beam widths



A *Large*

B *Normal*

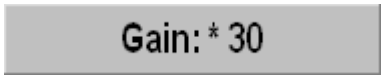
C *Narrow*

The normal setting on the SH90 sonar is **Normal**. This setting is basically designed for longer ranges.

You may also try setting **Auto**. This setting will automatically adjust the beam width depending on the current range.

About Gain

You can adjust the gain in many different ways, but the most important is the setting made by the **Gain** buttons on the Operating Panel and on the **Horizontal** and **Vertical** menus.



If you have too much gain, you will see a sonar picture with too many echoes. This is because the large amplification presents all kind of noise and reverberation that the sonar picks up. If the gain is smaller the noise and reverberation will disappear, but if it the gain is too small the fish echoes may disappear as well. In most cases you should try with a medium value.

On this sonar, you can adjust the horizontal and vertical gain independent of each other. The horizontal gain is used when the sonar operates in a horizontal mode, for example *Bow up* or *True motion*. If you switch to a mode with a vertical view, for example *True motion/Vertical*, your sonar will need a different gain setting for the beams directed towards the bottom.

To adjust the gain, see the relevant procedures.

Related topics

- *Adjusting the vertical and horizontal gain* on page 60

What is RCG?

RCG means *Reverberation Controlled Gain*. This is a two-dimensional filtering of the received echoes in order to suppress unwanted surface and bottom reverberation.

If you select *Strong*, the bottom echoes will disappear altogether if the bottom is flat, while schools of fish close to the bottom will be easier to see.

Note that scattered fish may be more difficult to spot if the RCG function is active, as these can be misinterpreted as reverberation. It is therefore important that you use the RCG with great care if your are searching for scattered fish.

Tip

We recommend that the RCG is active all the time, but be careful in the vertical presentation. The Reverberation Controlled Gain (RCG) works best on small schools.

Setting “1” is intended for schools. Setting “2” is made for schools with higher density. Try “3” for schools close to bottom, as this setting will also reduce the bottom echoes.

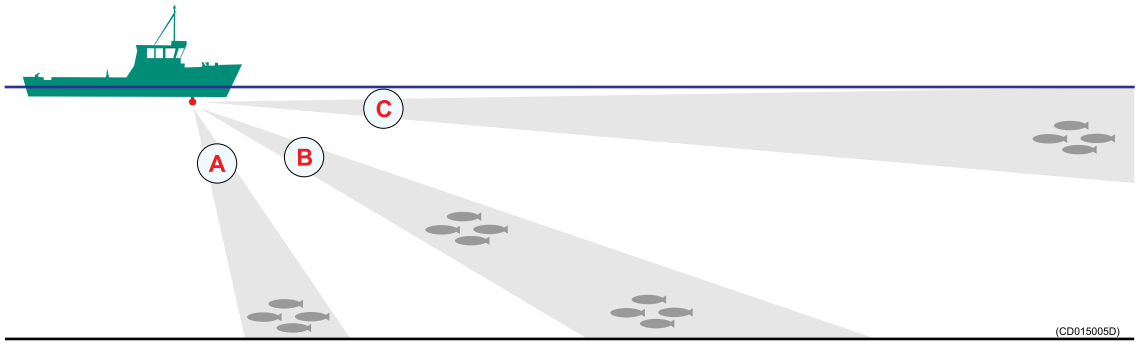
If you are looking for scattered fish, use RCG setting “4” or “5”.

Settings “6” and “7” are also intended for schools, while ”8” and “9” can be used on scattered fish. These settings use alternative algorithms.

About tilt

The sonar beam can be tilted vertically in steps of 1 degree, and the chosen tilt is shown on the sonar picture. At 0 degrees tilt you will transmit the sonar beam in parallel with the sea surface, while 60 degrees tilt will direct it almost straight down.

Figure 6 Tilt



The challenge will always be to find a tilt that prevents the fish echoes to be buried in reverberation and bottom echoes.

If you use a high tilt value (A) the fish will easily be disguised by the bottom echoes, but a strong RCG setting will help. As the distance from the bottom to the fish increases, the fish will be easier to see when the RCG removes the bottom echoes. However, this assumes that the fish echoes are considerably stronger than the bottom echoes.

If you use a very small tilt (C) you will not be bothered by bottom echoes. If the sea surface is gusty, you will however easily see echoes from the waves. These echoes will normally be rather weak, and will hardly move in relation to your vessel.

By means of a medium tilt angle (B) you will most likely be able to pick up scattered fish or schools if these are located at some distance above the bottom. The upper school in the illustration will appear on the sonar picture before the bottom echo, while the lower school will easily be disguised by the bottom echoes. Once again you can activate the RCG function to improve the reading.

Noise and reverberation

Every time you use the sonar the quality of your search operations will depend on numerous error sources caused by the natural environment and physical properties of your vessel. We distinguish between the two terms *noise* and *reverberation*.

- *Noise* is generated by the vessel: engine, propellers, winches, refrigerating plants etc.
- *Reverberation* is caused by natural conditions in the sea: temperature, salinity, sea state and bottom conditions.

The most common cause of acoustic noise is the propeller and the cavitation caused by its rotation. Other typical noise sources on board your vessels are winches, refrigerating plants, power generators, pumps and cranes. If you experience problems you think are caused by noise, try to find out which system that causes the noise, and contact your dealer for advice.

Topics

- *Cavitation* on page 107

- *Reverberation* on page 107
- *Blocking* on page 108
- *Check the noise yourself!* on page 108

Cavitation

As the propeller blades move through the water, low pressure areas are formed as the water accelerates around and moves past the blades. The faster the blades move, the lower the pressure around it will become. As it reaches vapour pressure, the water vaporizes and forms small bubbles of gas. This is cavitation.

Figure 7 Cavitation [1]

When the bubbles collapse, they cause very strong local shock-waves in the water. These may be audible and can also damage the propeller blades. In addition to this, the cavitation will generate very strong reverberation, commonly seen as a red stripe of echoes behind the vessel.

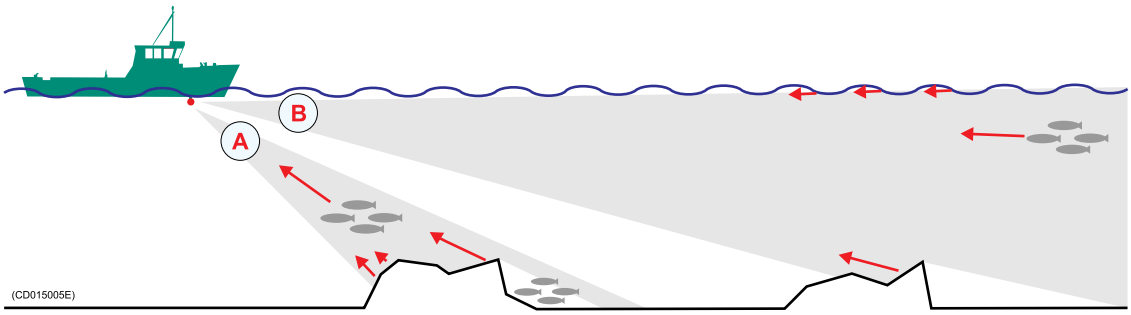
If you have big problems with cavitation, try to adjust the propeller pitch and/or the number of revolutions.

Reverberation

Reverberation is generated when the echoes from your sonar transmission are reflected not only by fish and objects in the water, but also from the bottom and the sea surface.

1. Photo from US Navy/Wikipedia in the public domain.

Figure 8 Reverberation



The echoes from the bottom will vary with how uneven the bottom is, what kind of bottom you have under your vessel, (rock, mud, sand etc.) as well as your current tilt setting. The echo from the sea surface will vary with the current sea state and your current tilt setting.

The illustration demonstrates how the bottom and the sea surface return echoes back to your sonar transducer. In situation (A) you will see several weak echoes from the waves and from the rock on the bottom, you will still be able to identify the school of fish. In situation (B) you will be able to identify the upper school of fish, but the lower school will be hidden in the shadow of the rock.

Be aware of that other vessels close to you will also generate reverberation due to the water disturbance caused by the wake, the propellers and the cooling water spill.

Blocking

The movement of your vessel through the water will often – especially in higher sea states – cause air bubbles to be generated, and these bubbles will move along the hull. This is called blocking. In order to prevent this noise from disturbing your sonar operations, it is important to lower the sonar transducer as far down below the hull as possible.

Check the noise yourself!

If you are bothered with acoustic or electric noise, you can easily run a few simple tests to identify the cause of the problem.

How to check the acoustic noise

This procedure provides a simple method to check the acoustic noise.

1. Click the **Setup** tab to open the menu.
2. Click the **Test** button to open the **System test** menu.
3. Click the **Test config** button, and select **Noise and VR** in the parameter dialog.
4. Click the **Close** button in the parameter dialog to close it.
5. Observe the **Echo level** button on the **System test** menu.
6. Read the noise level.

The level your read in the button is the current noise in the direction of the cursor. The noise is provided in dB, and the number should be as small as possible.

In order to reduce the noise, try to adjust the propeller pitch and the number of revolutions.

How to check for electrical noise

This procedure provides a simple method to check the electrical noise.

1 Switch off all electric equipment that can cause electrical noise.

This includes motor, propellers, thrusters, winches, cooling- and air conditioning systems, pumps, cranes, hydraulic systems etc.

2 Switch the equipment on again one at the time, and check the sonar every time.

With luck, you will spot which of your electrical systems that create the noise. To deal with the problem, consult your dealer and/or a certified ships electrician.

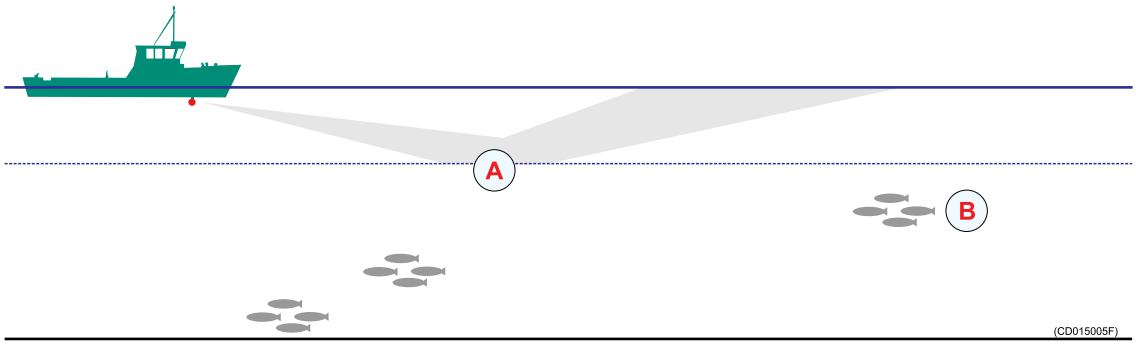
Layers and deflections

Your sonar operations may also be disturbed by environmental situations that you are unable to control. Two typical conditions are temperature and salinity layers, and deflections caused by increasing or decreasing water temperature.

Temperature and salinity layers

You may experience that temperature and/or salinity layers exist in the water column. Since the speed of sound in water depends on its temperature and salinity, such layers will cause the sound beam to be reflected.

Figure 9 Temperature and salinity layers

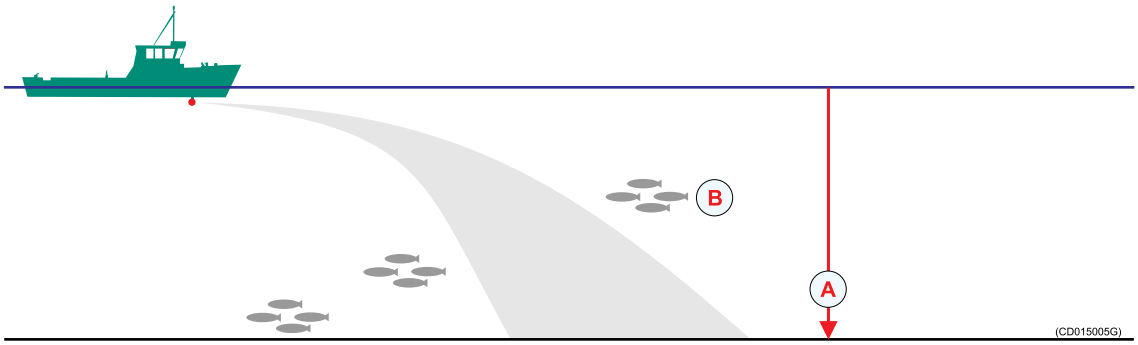


If you transmit a sonar beam down towards a temperature or salinity layer (A), it may be reflected as indicated in the illustration. The school of fish (B) you thought you would see will not be visible at all.

Deflections

On warm days – especially during summer – the sea surface will be heated by the sun, and the water temperature will gradually decrease with increasing depth.

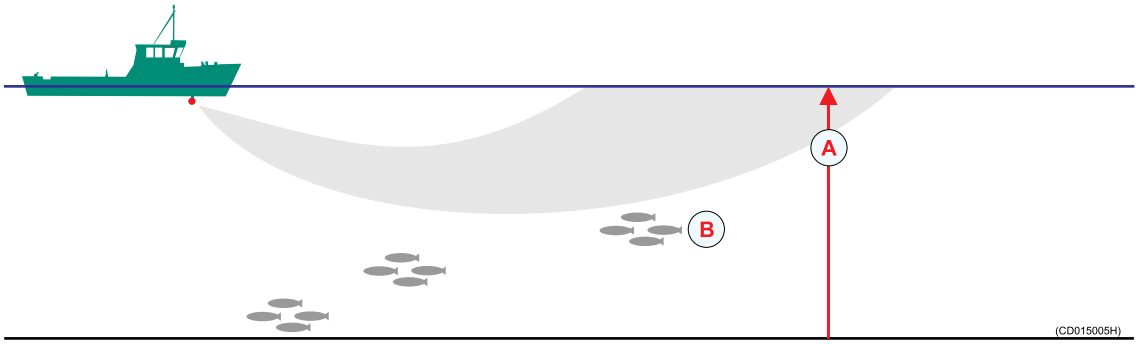
Figure 10 Water temperatures on warm days



When the temperature decreases (A) closer to the bottom, the sonar beam is deflected down as indicated by the illustration. The school of fish (B) you thought you would see is not visible at all.

On cold days, you may experience the opposite: the cold water will be close to the surface, and the water temperature increases with increasing depth.

Figure 11 Water temperatures on cold days



When the temperature decreases (A) closer to the surface, the sonar beam is deflected up as indicated by the illustration. The school of fish (B) you thought you would see is once again not visible at all, and you will also see a ring of surface echoes.

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